AN INTRA-CULTURAL STUDY OF THE RELATIONSHIP BETWEEN
GAMES AND THE DEVELOPMENT OF CLASSIFICATION SKILLS
IN ZULU CHILDREN

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DECLARATION

I, LYNN LASCELLES VAN ELDIK declare that "An Intra-Cultural
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SIGNED: ..Lynn van Eldik.......

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ABSTRACT

This study examined the relations between culture and thinking and focussed on classification ability in particular, among Zulu children in Natal.

The work was essentially intra-cultural in nature. The samples were drawn from a rural Zulu society in which traditional customs and way of life were practised and from a segment of the Zulu population which had adopted a westernised life-style and could be accurately described as being urbanised. The samples were small, consisting of five children in each, and testing was conducted in the Zulu language by the writer.

Some traditional games played by African children were perused in the light of their influence on the development of skills of classification. A brief ethnographic investigation was conducted in a rural community in Zululand.

A test was constructed which would give some measure of the children's ability to classify. Ten items involved two-dimensional objects and ten were of a three-dimensional nature. Every item required the Subject to categorise and re-categorise objects according to different criteria.

Prior to testing, time was spent with the subjects in an attempt to reduce the variables of shyness and anxiety. When the testing was completed, a morning was devoted to mediation. The Zulu children played with western type games which were based on classifying processes and these were linked to their own familiar objects such as food, plants and beads. The notion that things can be sorted in different ways was put across.

Because of the time factor, post-mediation testing was carried out using only the two-dimensional part of the test. The results were analysed qualitatively rather than quantitatively on the basis of performance and verbal response, since the samples were too small for significant statistical scrutiny. It was therefore possible to hazard only tentative conclusions.

The hypotheses that Zulu childrens' classification skills tend to be situation specific; that through mediation such skills may be enhanced; and that children living a more westernised life-style would perform better on such tasks than their rural counterparts were supported. One of the most important findings was that, given a situation where classification was functional or meaningful to the Zulu child, such as in a game or in a practical life-situation, categorisations or groupings were made without apparent difficulty. Given an "artificial" situation such classifications were not made so easily.

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1.   INTRODUCTION

In the earlier period of cross-cultural research, (from the end of World War 2) the methods of educational practitioners were applied rather indiscriminately to Third World countries. Later it was attempted to understand and research the cognitive factors underlying group performance differences. During this stage (in the 1960's and 1970's) members of different disciplines came together to compare methods and claims about human behaviour and to consider the implications of their separate fields of study for education. There was general agreement that some sort of ecocultural approach was necessary especially in view of the ways that psychological experiments were used to make claims about basic cognitive processes. Rogoff (1981) for example discussed the issue of context-specific cognitive behaviour.

The Laboratory of Comparative Human Cognition (1986) reports that more recent approaches which help people to discover the virtues of practices they have under-valued have been useful. This attitude is encountered also in the new awareness of African peoples of the pedagogical value of games, for example.

Educators will have to deal with the great degree of diversity that a heterogeneous population presents to the practising classroom teacher. The question is: will the schools be able to retain their goals of specific forms of educational achievement and simultaneously take advantage of various unique configurations of childrens' background experience? (Laboratory of Comparative Human Cognition 1986).

In South Africa today we see on the one hand a modern, technologically sophisticated sector, one might say a First World country. On the other, side by side, we find communities living in what could be termed Third World conditions. This situation has resulted in a rapidly

growing group comprising of people who do not quite belong in either of the above described groups. They are aware of opportunities for socio-economic and human development, yet suffer a high degree of stress induced by the swift rate of change occurring which "often tears cultures, communities and families apart in the process of industrialisation and urbanisation" (Rautenbach, 1985). Frustrated aspirations frequently result in activities (eg. school boycotts and riots) which ultimately jeopardise development of an infrastructure which would foster cognitive abilities so vital in the peoples of a First World Country.

Piaget, Vygotsky and Luria for example consider that it is the joint effect of physiological growth and interactions with the human and physical environment which develops the structures of thinking. Therefore if we are to be able to discuss the cognitive development of an individual meaningfully, it is imperative that we also understand the environment in which s/he is growing up. Such a child will be developing schemes and thinking skills appropriate to that particular environment.

The early development of the process of classification among Black children in relation to the understanding of mathematical concepts was of particular interest in the study but was not expanded upon in detail. However, the issue will be referred to from time to time throughout the study. Mays (1985) observes that many of the approaches in mathematics are culturally determined and quotes examples of individuals in Papua New Guinea who find it extremely difficult to generalise or use hypotheses because in their culture they consider that every problem arises from a particular and unique set of circumstances and can only be solved within the context of those very circumstances. General rules, abstract logic and symbolic representation are therefore not only perceived as unnecessary, but totally incomprehensible. Mathematical concepts, for example, are a matter of directed purpose, says Mays; what is in the mind

is there partly because our culture decrees it. Very early in their lives babies encounter their own directive culture. First World babies will very soon be provided with sets of stacking cups, nesting dolls and picture cards which can be grouped or classified together in particular ways. When they play they are directed by the caregivers to group things and they are learning about quite an advanced concept at an early age.

Contemporary development projects often transfer part of the technology or social structures _from_ more industrialised communities _to_ less industrialised ones. This is generally done through replacing the traditional way of educating the young with formal schools and curricula designed in First World cultures. Rautenbach refers to it as "as effort at mass cultural transfer". The rapid changes brought about in non-industrial communities when they come into close contact with industrial communities result often in disruption, loss of culture and traditional child rearing practices.

This study examines the effects of a more Western life-style on some Zulu people in Natal and how changes and adaptations on the part of these people may have affected concept formation in the young child. A fairly wide variety of disciplines, such as cross-cultural psychology, linguistics and anthropology have of necessity been considered.

2.   THEORIES UNDERLYING THE STUDY

2.1   THE INTERACTION BETWEEN LEARNING AND DEVELOPMENT

2.1.1   Vygotsky's Theory of Social Development

There are three major theoretical positions regarding current conceptions of the relation between development and learning:

Firstly, there is the assumption that processes of child development are independent of learning. This position assumes that development is always a pre-requisite for learning and if a child's mental functions (intellectual operations) have not matured sufficiently, then no instruction will prove useful. Piaget for example, believed that learning forms a superstructure over development, leaving the latter essentially unaltered.

A second theoretical position holds that learning is development, the latter being viewed as the mastery of conditioned reflexes, or the accumulation of all possible reflexes.

A third theory attempts to overcome the differences between the first two described above by combining them. Development is seen as being based on two inherently different, but related processes each of which influence the other. For Koffka (1924), for example, the process of maturation prepares and makes possible a specific process of learning, i.e. learning and development do not coincide. This led to deeper consideration of the pedagogical problem of teaching subjects because of their value to "general mental development" such as classical languages to increase childrens' reasoning abilities. Vygotsky challenges the assumption that mental capabilities function independently of the material with which they operate and that the development of one ability entails the development of others. Vygotsky's contention was in accord with

Thorndike's (1914) research and some of his research shows that the mind is not a complex network of general capabilities such as observations, attention, memory, judgement etc., but a set of specific capabilities, each of which is, to some extent, independent of the others and is developed independently.

Learning is more than the acquisition of the ability to think, it is the acquisition of many specialised abilities for thinking about a variety of things. According to this view of Vygotsky, special training affects overall development only when its elements, material and processes are similar across specific domains. Improvement of one function of consciousness or one aspect of its activity can affect the development of another only to the extent that there are elements common to both functions or activities.

Developmental theorists such as Koffka (1924) and the Gestalt School oppose the views of Thorndike (1914). They assert that the influence of learning is never specific, and argue that the learning process can never be reduced simply to the formation of skills but it embodies an intellectual order that makes it possible to transfer general principles discovered in solving one task to a variety of other tasks. The child, while learning a particular operation, acquires the ability to create structures of a certain type, regardless of the diverse materials with which he is working, and regardless of the particular elements involved. Briefly, Thorndike believes that learning and development coincide at all points, while for Koffka, development will always precede learning.

Vygotsky's work provides a rich source of ideas about ways to reconcile the study of culturally organised experience with the study of cognition. Central to his work was the approach that denied the strict separation of the individual and its social environment; they were seen as mutually

constitutive elements of a single interacting system.

Vygotsky proposed a general law of cultural development, which said that any higher psychological function appears on two planes. First it appears on the social plane and then on the psychological plane. First it appears between people as an interpsychological category and then within the individual child as an intrapsychological category (Vygotsky, 1978). Thus he stressed the importance of cultural transmission and intentional mediation of the learner's experience.

Vygotsky talks about the social origins of indirect (mediated) memory and he considers that even at the earliest stages of social development, there are two, principally different types of memory:

Direct memory, dominating the behaviour of non-literate peoples, which is characterised by the non-mediated impression of materials by the retention of actual experiences. This is natural or eidetic memory. There is a quality of immediacy in this type of mental process, and it is very close to perception.

Secondly, co-existing with the above memory-type and going beyond the purely biological dimensions of the human nervous system, is the artificial, self-generated, sign-using memory. This is unique to human beings and is the product of specific conditions of social development. The use of signs to mediate reactions to external stimuli indicates that the individual must be actively engaged in establishing such links and such use leads humans to (higher) forms of psychological operations which create new forms of culturally-based mental processes.

Sign operations, according to Vygotsky, appear as a result of a complex and prolonged process subject to all the basic laws of psychological evolution. Within a general process

of development, two qualitatively different lines of
development, differing in origin, can be distinguished: the
elementary processes, which are biological in origin, and
the higher psychological functions of socio-cultural origin,
on the other. The history of child behaviour is born from
the interweaving of these two lines. The very essence of
human memory consists of the fact that human beings can
actively remember with the help of signs.

The internal reconstruction of an external mental operation
Vygotsky calls Internalisation of higher Psychological
functions, and he describes a series of transformations
which lead to this:

a) An operation that initially represents external activity
   is reconstructed and begins to occur internally.

b) An interpersonal process is transformed into an
   intrapersonal one. Every function in the child's
   cultural development appears twice: first, between
   people, and then inside the child. This applies also
   to the formation of concepts. All the higher functions
   originate as actual relations between human individuals.

c) The transformations of an interpersonal process into an
   intrapersonal one is the result of a long series of
   developmental events. The process of being transformed
   continues to exist and to change as an external form of
   activity for a long time before definitely turning
   inward.

The internalisation of cultural forms of behaviour involves
the reconstruction of the psychological activity on the
basis of sign operations. The developmental changes in sign
operations are like those which occur in language. Aspects
of external or communicative speech as well as egocentric
speech turn inward to become the basis of inner speech.
Vygotsky says that the internalisation of socially rooted
and historically developed activities is the distinguishing
feature of human psychology - the basis of the qualitative

leap from animal to human psychology.

2.1.2   The Zone of Proximal Development - A new approach

Vygotsky argues that childrens' learning begins long before they attend school, and that learning in the preschool years differs markedly from school learning. The young child, through asking questions, imitating adults and being instructed about how to act, develops an entire repository of skills.

Vygotsky criticises Koffka for making the error of failing to discern the specifically new elements of learning that school introduces. He and others make the assumption that preschool learning is non-systematic and Vygotsky elaborates the dimensions of school learning by describing what he says is an exceptionally important concept, namely, the zone of proximal development. There are 2 developmental levels to be considered, the <u>actual developmental level</u> and the <u>potential developmental level</u>.

When we determine a child's mental age by using tests we are almost always dealing with the actual developmental level, i.e. the result of already completed developmental cycles. If, on the other hand, we offer leading questions or show how the problem could be solved and the child then solves it or solves it in collaboration with other children, the solution is most often not regarded by psychologists/ educators as indicative of his mental development. In other words, they never entertained the notion that what children can do with the assistance of others might be in some sense even more indicative of their mental development than what they can do alone.

The zone of proximal development defines, then, those functions that have not yet matured but are in the process of maturation; functions that will mature tomorrow, but are currently in an embryonic state. These functions could be

termed the "buds" or "flowers" of development rather than the fruits of development. The actual developmental level characterises mental development retrospectively while the zone of proximal development characterises mental development prospectively.

The zone of proximal development furnishes psychologists and educators with a tool through which the internal course of development may be understood. It permits us to delineate the child's _dynamic_ developmental state. Vygotsky stresses that the child's mental development can be determined only by clarifying its two levels: the actual developmental level and the zone of proximal development.

The American researcher McCarthy (1930) showed in her study with 3-5 year olds that if we can determine the maturing functions of children, we can predict what they will be capable of, providing the same developmental conditions are maintained.

A full understanding of the concept of the zone of proximal development must result in re-evaluation of the role of imitation in learning, says Vygotsky. So far, it is almost entirely the independent activity of children, not their imitative activity which is considered to indicate their level of mental development.

Vygotsky refers to Kohler's (1925) experiments with the problem solving abilities of apes and he considers that the intellect of animals cannot be improved, that is, they cannot be taught to solve a variety of more advanced problems independently, through imitation. For this reason, he concludes, animals are incapable of learning in the human sense of the term and they have no zone of proximal development. Human learning presupposes a specific social nature and a process by which children grow into the intellectual life around them.

Vygotsky proposes that the zone of proximal development enables us to propound a new formula, namely that the only good learning is that which is in advance of development. Learning which is oriented towards developmental levels that have already been reached is ineffective from the viewpoint of the child's overall development. It does not aim for a new stage of the developmental process but rather lags behind.

Regarding the acquisition of language, Vygotsky notes that language arises initially as a means of communication between the child and the people in his environment. Only subsequently upon conversion to internal speech, does it come to organise the child's thought, or become an internal mental function, also freeing him from the immediate constraints of his environment.

Piaget, too, considered that the same way that internal speech and reflective thought arise from the interactions between a child and the persons in her environment, these interactions provide the source of development of the child's voluntary behaviour.

Vygotsky proposes that an essential feature of learning is that it creates the zone of proximal development, i.e. learning awakens a variety of internal developmental processes that are only able to operate when the child is interacting with people in his environment and in co-operation with his peers. Once these processes are internalised they become part of the child's independent developmental achievement. Thus learning is a necessary and universal aspect of the process of developing culturally organised, specifically human, psychological functions.

2.1.3 Vygotsky's Experimental Methodology

Vygotsky's theories may be seen to be of enormous importance to our understanding of how children learn, especially his examination of such phenomena as memory, inner speech and play. Intellectual development as he saw it, is "a complex dialectical process characterised by periodicity, unevenness in the development of different functions, metamorphosis or qualitative transformation of one form into another, intertwining of external and internal factors and adaptive processes". (Mind in Society, page 121).

In general, Vygotsky's work shows clearly his concern with understanding the mental processes of all people and with producing a psychology that would have relevance for education and medical practice. He has been mistakenly accused of advocating mass psychological testing and cricitised for suggesting that non-literate peoples (such as those living in the non-industrialised sections of central Asia) had not yet developed the intellectual capacities associated with modern civilisation.

It should be mentioned that Vygotsky's experimental methodology and style of experimentation differed quite radically from that of American psychology where the purpose of an experiment as conventionally presented is to determine the conditions controlling behaviour. Methodology follows from this objective: the experimental hypothesis predicts aspects of the stimulus materials or task that will determine particular aspects of the response, the experimenter seeks maximum control over materials, task and response in order to test the prediction. Quantification of responses provides the basis for comparison across experiments.

Vygotsky believed that his method (the experimental - genetic method) could serve an important role by making visible those processes that are ordinarily hidden beneath the surface of habitual behaviour. The investigator can create processes that telescope the actual course of development of a given function. The experiment provides maximum opportunity for the subject to engage in a variety of activities that can be observed, not just rigidly controlled.

For example, Vygotsky provided alternative routes to problem solving in his tasks, or included a variety of materials which could be used to satisfy the demands of the task; or another technique was to set a task before the child that exceeded his knowledge and abilities in order to try and discover the rudimentary beginnings of new skills.

With all these procedures, the critical data furnished by the experiment is not performance level as such, but the methods by which the performance is achieved. The contrast between conventional experimental work (focussing on performance) and Vygotsky's work (focussing on process) has it's contemporary expression, for example, in recent studies on children's memory by American investigators, where their organisational strategies have been noted. (Flavell et al 1969)
As with Vygotsky, the central question being asked is: What are the children doing? How are they trying to satisfy demands?

Vygotsky's experimental results are qualitative rather than quantitative, therefore, and detailed descriptions based on careful observations constitute an important part of experimental findings, which was essentially the model upon which this study of Zulu children was based. To Vygotsky, anthropological and sociological studies were partners with observation and experiment in the enterprise of accounting

for the progress of human consciousness and intellect.

John-Steiner and Souberman (1978), while editing Vygotsky's manuscripts, found that increasing familiarity with Vygotsky's ideas helped them to go beyond the polarities of contemporary psychological writings. In their research, they discovered the power of his concepts as applied to their work as well as to the daily observations of human behaviour, and found that some of his ideas have a potency and originality which forty years after his death, still offer new and unfulfilled promise for both psychology and education.

Vygotsky's interest in cognitive development among non-literate peoples and the effects of rapid social change on their cognitive processes were of particular interest to many contemporary educators in countries undergoing rapid modernisation and urbanisation.

John-Steiner and Souberman (ibid) comment that even in the United States where the concept of public education is long-standing, similar issues arise because there are large groups of people who have not integrated fully into the system.

In conclusion, it is of interest to note that Vygotsky differed from Piaget regarding the development of intelligence insofar as he focussed upon the historically shaped and culturally transmitted psychology of human beings. Both Vygotsky and Piaget shared the emphasis on an _active_ organism as well as the ability to observe children astutely. While Piaget stressed the biologically supported, universal stages of development, Vygotsky's emphasis was on the interaction between changing social conditions and the biological substrata of behaviour and their "interlacement" at each stage of the child's development. Vygotsky essentially viewed the organism as highly plastic and the environment as historically and culturally shifting contexts

into which children are born and which they, too, will eventually change.

2.2 A.R. LURIA

Luria (1976), Vygotsky's student and collaborator, elaborated on Vygotsky's concept of mental processes where he described elementary structures (conditioned chiefly by biological determinants) and higher structures (which emerge in the process of cultural development). Luria stated that the components and relations into which these unitary functions enter are formed during each individual's development and are dependent upon the social experiences of the child. The functional systems of an adult, then, are shaped essentially by her prior experiences as a child. Previously separate and elementary functions are integrated into new functional learning systems, which suggests unlimited potential in the development of cerebral activity.

In the early 1930's Luria (1976) investigated the hypothetical links between socially organised modes of interaction and cognition. He worked in the remote areas of Central Asia where peasant societies had experienced radical changes in their way of life following the programme of mechanisation and collectivisation undertaken by the Soviet Union. Such changes occurred rapidly and meant a drastic shift in modes of social control, abandonment of their pastoral existence, learning a new language and exposure to a foreign ideology. This appears to be a fairly close parallel to what has happened to many Zulu people in South Africa and so Luria's findings are of particular interest.

One of his observations with the Uzbekis, who had altered their mode of living to conform with the literate, collectivised lifestyle, was the changed way they responded to classification and reasoning tasks. They based their classifications of verbally presented items on taxonomic functions rather than the common functions that the objects

could fulfil. It was only at a global level that Luria's results could really be interpreted. One could say that there was a shift from "functional" to abstract responses only for <u>some</u> tasks in the collectivised Uzbekis as compared to those who retained the traditional culture. Cole (1985) criticises Luria's studies in Uzbekistan on the grounds that he had failed to establish a detailed theory of Uzbeki adult activities before research was undertaken.

2.3 A.N. LEONT'EV AND THE CONCEPT OF ACTIVITY

It is important to consider the ideas of Leont'ev (1972) who discusses the shortcomings of research carried out in what he terms a "two-part scheme" (all manner of stimulus-response theories) because such approaches exclude "the process that active subjects use to form real connections with the world of objects". This criticism applied to all cross-cultural psychological research, including Luria's.

Leont'ev insists on the need for a 3-part scheme in which the third part, encompassing the other two, is the subject's <u>activity</u>, including the goals, means and constraints operating on the subject. He asserts that:

> "Human psychology is concerned with the activity of concrete individuals, which takes place either in a collective - i.e. jointly with other people - or in a situation in which the subject deals directly with the surrounding world of objects ... e.g. at the potter's wheel or the writer's desk .... if we removed human activity from the system of social relationships and social life, it would not exist .... the human individual's activity is a system in the system of social relations. It does not exist without these relations" (Leont'ev 1981 pp 46-47).

This concept of activity provided the basic unit of analysis that Vygotsky and his colleagues had been using in a partially articulated way in their research.

2.4   FEUERSTEIN'S THEORY OF MEDIATED LEARNING EXPERIENCE

Although Feuerstein does not clearly acknowledge it, his
concepts of structural cognitive modifiability and mediation
has obvious links with Vygotsky's work. Feuerstein
postulates that learning takes place in two ways:

Firstly, Piaget's direct exposure to stimuli bringing about
changes in the structures of the organism via a process of
assimilation and accommodation. Feuerstein sees this as the
most pervasive source for changes brought about in the
organism.

However, he found Piaget's theory to have limitations and he
introduced a second modality by which the organism develops
and becomes modified:

Secondly, Mediated Learning Experience (MLE): This is a
process whereby an interposing individual mediates the world
to the child by intentionally:

    (a)   transforming

    (b)   selecting

    (c)   scheduling

    (d)   framing

    (e)   grouping

    (f)   segregating

stimuli thus providing the organisism with modalities of
selecting, focussing and grouping objects and events.
In other words, stimuli are transformed by a mediating
agent who, guided by his intentions, culture and
emotional investment, selects and organises the world of
stimuli for the child. This generates behaviour
patterns and learning sets which enhances his capacity
to become modified through further exposure to stimuli
(Feuerstein 1980).

Feuerstein describes learning as the generation of, or change in the mental structures after exposure to or experience with impinging stimuli as distinct from changes incurred through maturation. He postulates that an appropriate explanation for the variation among individuals in acquiring mental structures would be that there would be differing rates in the efficiency of organisms to respond to stimulus situations. He claims that cognitive processes which are ineffectively or seldom used, or even absent altogether can be enhanced, modified and/or established. The aetiology of the individual's condition would affect the time over which this process could be effected. This represents an optimistic view of the potential of the organism in direct contrast with the classical theory notion of the organism as deficient.

Feuerstein claims that the more the organism is subjected to MLE and the earlier he is subjected to it, the greater will be his capacity to efficiently use and be affected by direct exposure to sources to stimuli.

Conversely, children who are considered to have learning problems are children who have a condition that makes them inefficient in their use of impinging stimuli and are therefore affected in only a limited way. Feuerstein describes these children as having a low degree of modifiability, or being "retarded performers".

Feuerstein refers to such children as culturally deprived. This is an individual who is in a reduced state of modifiability i.e. a person with a reduced capacity to modify his intellectual structures in response to sources of stimulation.

In the context of this theory the brain can be likened to a self-programming computer (Rautenbach 1985). If the brain is the computer then the schemes are the programmes which

are developed during the course of the brain's interaction with the environment.

Culture represents an interaction between a particular group of people within a particular environment. That interaction consists of evolved programmes or schemes by which the people can interact with each other and the environment. It makes no difference which culture or which environment. What is crucial is the set of schemes because they provide the thinking skills by which the people adapt and interact.

Feuerstein sees culture as the process whereby knowledge, values, beliefs and systems are passed on from generation to generation, the caregiver mediating it in a way which develops the capabilities of the child.
Therefore he sees deprivation as the failure on the part of the group to fulfil this task. This occurs in both advantaged as well as disadvantaged groups.

It seems to occur in societies that have undergone rapid change as a result of which the environment and the culture are divorced, the old culture is no longer applicable to the new environment and a new culture has not been assimilated. In many cases this is also aggravated by poverty and/or the necessity of both parents working (Grossman 1984).

The aim of Mediated Learning Experience is enhancing the capacity of an organism to become modified through direct exposure stimuli.

For Feuerstein MLE represents the central aetiological determinant for differential cognitive behaviour. Children who are not achieving according to their potential, or those with learning problems, are regarded by him as children with retarded cognitive development (retarded meaning arrested rather than deficient).

Feuerstein claims that MLE is the proximal aetiology of retarded cognitive performance which can be triggered or exacerbated by terminal factors among which are:

1) Genetic disorders
2) Socio-economic situations
3) Emotional problems

It must be remembered that such conditions do not invariably determine a specific outcome(Feuerstein (1979). Conditions of the organism itself might make it impenetrable to mediation eg. neurological or physiological factors. A programme of intervention can be designed and implemented to facilitate changes in the cognitive structure for a particular individual.

He contends strongly that with the exception of the most severe cases of genetic and organic impairment, the organism is open to modifiability at all ages and stages of development.

It is an optimistic view which focuses on the positive qualities of the child rather than the deficiencies. His model brings the teacher back into the picture in a fundamental role as a mediating individual who selects and organises the world of stimuli for the child, poses questions which allows the child to search for answers and then create his own questions, thereby structuring his own knowledge (Grossman 1986). The teacher can be seen as a resource rather than a source of knowledge (Adams 1985).

Skuy (1988) points to the importance of considering temperament and its role in assessing a child's ability to benefit from MLE. His study (1988) investigated the relationship between temperament and the structural cognitive modifiability of Black adolescents in Soweto.

2.5 FRANKENSTEIN'S THEORY (1979)

Frankenstein (1979) provides an interesting dimension to the issue when he describes the concepts of primary and secondary retardation. He talks about education as a liberation of the individual's potentials, part of which may never have reached the level of actuality; it is the power whereby lost or impaired dispositions may be restored. The true educator will be as Feuerstein describes: a mediator in the learning process.

Every child, even the most gifted, needs someone who will make him aware of the personal meaning of learning. Even more important is the problem of how to uncover and activate potentials of children whose intelligence is impaired by certain environmental conditions. Frankenstein writes about how certain life conditions almost inevitably produce an externalised life-style that may be detrimental to the intellectual development of many children born into poverty, neglect or cultural ambiguity. He discusses ways in which teaching may help them out of this situation. Their predicament is that they are compelled both to fail and to function beneath their potential abilities. This condition Frankenstein calls "secondary retardation". In his work, he illustrated, with a number of examples, the intrinsic interconnection between individual treatment and teaching.

3.   CROSS-CULTURAL COGNITIVE PSYCHOLOGY

3.1   RELEVANCE OF PIAGET'S THEORY

For Piaget, knowledge is living and growing in the organism, and he views the human being as a biological organism in constant interaction with it's environment. Piaget considered therefore, that knowledge cannot be studied in isolation from this interaction. This would suggest that knowledge is a separate thing in itself.

Knowledge, he claimed, resides in the inherited structures which interact with the environment to bring the assimilation and accommodation of information. The structures are dynamic, never static; are constantly evolving and changing during this interaction and bring about transformation during Piaget's well-known four developmental stages.

The classical formulation of Piaget's position concerning cultural variability in cognition is given in his 1966 article "Need and significance of cross-cultural studies in genetic psychology". He stresses that a child comes to know the world by what he does in it. He lives in a social world, and while children in different cultures do not necessarily achieve various cognitive structures at the same average ages, the sequence of development, according to Piaget, seem identical even in very different cultures.

Four sets of factors responsible for cognitive development are summarised (Dasen 1977).

Biological factors which interact with the physical environment during parturition and growth.

Equilibration factors which arise as the young organism interacts with its immediate physical environment.

Social factors of interpersonal co-ordination which arise as child and adult exchange information and the child learns to co-ordinate his behaviour with the activities of important others.

Educational and cultural transmission factors which are culturally distinct pressures to learn about specific features of the (cultural) environment (as reflected, for example, in different classification schemes).

Dasen (1977) considers that the standard perspective on this categorisation of causal factors in development has generally been that the first three lead to prediction of universality with the burden of cultural variation falling into the fourth category.

By 1978 the situation was seen to be more complex. Whereas the empirical verifications of the sequencing of major stages of cognitive development described by Piaget seemed to have remained a robust phenomenon universally up until the concrete operational stage, failures to find formal operational thinking in some cultures have suggested that it is necessary to establish first the end state towards which developmental processes move in different cultures. Greenfield (1976) warns that if this step is not taken, the absence of a formal operational stage becomes a theoretical non-sequitur, which presupposes the western scientist as the epitome of developed thinking.

Evidence about "lags" in development of various concepts for various cultural groups have met with 3 kinds of response:-

3.1.1 Psychological Method Critiques:

Investigators have become increasingly aware of problems arising from unfamiliarity of materials, use of standardised questioning procedures, inhibitions produced by the presence of foreigners and language difficulties.

In the Zulu study described in Chapter 5, the above problems were addressed by designing a set of test items using materials, reasonably familiar to Zulu children in the sample; adopting a flexible, clinical-interview type of questioning which adhered to local norms of conversation and interaction, due to the fact that the researcher spoke the Zulu language herself; and lastly an attempt was made to become familiar with the group of children before the sample was even selected.

3.1.2 A Competence-Performance Distinction

Flavell and Wohlwill (1969) assert that the probability of successfully completing a given task is the product of the probability that the child has acquired the operational structure and that the relevant attributes will be applied in the operational structure. Dasen (1977) adds a third factor, representing the probability that the operation called for by a given task "will in fact be called into play in a given cultural milieu".
This formulation gives us performance as a multiplicative outcome of <u>competence</u>, <u>task-specific</u>, and <u>culture-specific</u> knowledge.

As described in Chapter 5, the issue of cultural milieu was interesting: the question arose of the particular competence being called into play by a particular task (viz. the task of classifying) in what apparently was an inappropriate situation (the classroom). It was suspected by this researcher that one could add to Dasen's formulation described above: "<u>situation-specific</u>" performance.
If the Zulu children had been asked to classify objects in a different <u>situation</u>, for example, in their daily life activities in the kraal, what would the level of competence have been?

3.1.3 Learning more about Local Cultural Conditions

This represents a third major direction in cross-cultural Piagetian research. Researchers are faced with the necessity of specifying the kinds of culturally organised experience that foster the development of particular competences.

To sum up; cross-cultural Piagetian research began with a strong set of hypotheses regarding the order in which a variety of tasks would be mastered ontogenetically, a competence model linking these tasks to cognitive development. This theory assumed cognitive universals because of an (unexamined) belief in universal organism-environment interactions that underpin development. Much of the early work in this tradition represented a classic example of tests being used as measures (despite the example set by Piaget). Failures to find equal performance across groups motivated a search for ways to include culture in the form of varied materials and procedures designed to equate (psychologically) relevant test factors; familiarity, for example.

In the paper "What's Cultural about Cross Cultural Cognitive Psychology" the Laboratory of Comparative Human Cognition (1979) points out that only as researchers in Cross-Cultural Cognitive studies encounter greater and greater difficulties, have they begun to look seriously at more complex features of the culture, searching for the presence or absence of culture specific cognitive achievements.

Brislin, Lonner and Thorndyke (1973) defined the field of cross-cultural cognitive psychology as being "the empirical study of members of various cultural groups ... who have had different experiences that lead to predictable and significant differences in behaviour".

Often ethnographic work has been based on selected aspects
of the culture, taken out of context to permit later
quantification. Studies should attempt to avoid such a
pitfall by examining cognitive processes from a qualitative
rather than a quantitve viewpoint, seeking to survey the
process involved within its specific cultural milieu.
However, the scope of this research remains essentially only
a "spot observation" and Rogoff (1976) points out that even
careful spot observations can succeed only if there is a
theoretical link between the observations of everyday
behaviour (or indigenous activities) and the cognitive tasks
that are the independent measures. Such work must contain a
fine-grained description of the activities that different
socialisation practices require of children.

It is felt by writers such as Rogoff (1978), Cole, Glick and
Gay (1971) that culture is still distressingly absent on
the dependent variable side of a great deal of cross-
cultural work where psychometric ability tests continue to
be treated as measures instead of samples. The absence of
well-defined theories of the task-specific activities which
give rise to the dependent variables is a central source of
ambiguity in almost all this type of work. Advances in this
area will certainly depend on cross-cultural psychologists
applying the most advanced techniques for specifying process
that the noncomparative study of cognitive processing will
allow. Cases in which there is a strong theory of the task
and its relation to cultural practices point the way to
incorporating culture into our dependent variables. Greater
emphasis will have to be put on developing cognitive
ethnographies. A new concern for specifying culturally
organised activities on a level which the psychologist can
use is one of the major tasks confronting the study of
culture and cognition.

Cole (1985) in his paper "The zone of proximal development: where culture and cognition create each other" expresses concern at the intellectual separation of anthropology and psychology. He notes that textbooks on cognitive and developmental psychology are written as though data on cognitive development were separable from an understanding of the cultural circumstances in which people grow up.

3.2 COGNITION AND CULTURE

Cole considers that studies of cognition in various cultures have been weakened by the failure to deal properly with real contexts of activity found in the culture, substituting European-derived tasks for indigenous ones.

Cole and Scribner (1974) say that we are interested in finding out what has been learned about _how_ people perceive the environment, _how_ they classify it and _how_ they think about it.

The concern should be to get beneath the performance shown in a particular situation to the psychological processes responsible for it.

Cole and Scribner (1974) caution against making rather simple connections between culture and cognition. They ask the question: "When we find, as many have, that educated and uneducated rural Africans differ in their performance of some cognitive task, how are we to say what features of their cultures caused the difference?" They encourage cognitive researchers to discover a strategy of research that will help to uncover how individual and cultural processes interweave with each other as the child develops and becomes integrated with his society.

3.3 CULTURE AND THINKING

Cole et al (1971) draw our attention to the problem of many
disciplines, and how tangled various theoretical approaches
have become. They discuss anthropology, linguistics and
psychology in particular:

3.3.1 Anthropology

In a very broad sense it is suggested that the study of
culture is the study of human thought. Early
anthropologists argued that cultural differences explain
cognitive differences, and even that the evolution of
intellect can be inferred from the assumed evolution of
culture. Society was seen to be evolving toward a literate,
technological state.

Boas (1911) challenged the reliability of the belief that
one can draw inferences about thought processes from
traditional beliefs and customs of a people (Cole et al
1971).

In 1910 Levy-Bruhl, as mentioned by Cole et al, put forward
the argument that primitivity of material and religious
culture is sufficient evidence to prove the existence of
primitive mental processes. This was criticised by
anthropologists who pointed out that "all peoples at times
think in terms of objectively probable causations, just as
at times, they indulge in explanations that relate a fact to
an apparent cause" (Herskovitz 1962, p.361 quoted by Cole et
al).

Cole et al quote Levi-Strauss (1966) who emphasised
differences in the kinds of categorisations produced by
different peoples. Thought processes represent different
strategies by which men make nature accessible to rational
enquiry; all peoples proceed by ordering, classifying, and
systematising information; all create coherent systems. He
poses the questions: what are the differences among

primitive and civilised thought processes? He argues that
the basic difference seems to involve the kinds of
attributes that are used in forming classes. Primitive
classification systems are based on qualities that are
readily seen and experienced, whereas modern science relies
more on properties that are inferred from necessary
relations in the structure of objects classified e.g. fruits
and vegetables are classified by the average shopper in ways
quite different from the botanist.

He suggests that societies only name things which serve some
practical or symbolic purpose for them, things which are
important in their daily lives.

Modern ethnoscientists seem to accept that category systems
vary widely from culture to culture and that cultural
differences in thought processes are reducible to
differences in classification systems. In a primitive
system a particular object is likely to have a rather
amorphous and shifting status because of the nature of his
classification system, where an object might often be
adapted to other purposes unlike the more fixed and stable
structure of making and using things in western culture.

Lave (1988) talks about a "social anthropology of cognition"
rather than a "psychology" because there is much reason to
feel that what we call cognition is actually a complex
social phenomenon. She describes the arrangements of
knowledge in the head corresponding in a complicated way to
the social world outside the head, and that they are
socially organised in such a way as to be indivisible.

3.2.2 Linguistics

Cole et al quote Benjamin Whorf (1956) as putting
forward the argument that each language is itself the
shaper of ideas; the programme and guide for the
individual's mental activity. It is felt by this school
that no theory of cognition that fails to take

linguistic competence into account can be considered adequate.

He argues that language embodies our view of the universe, and that we dissect nature along lines laid down by our native languages. His theory of linguistic relativity says that speakers of different languages will have different conceptions of experiences in the world; we are in fact, each intellectually imprisoned by the language we speak. (Lloyd 1972).

Curran (1980) considers the importance of examining variations in language structure among cultures. The more culturally meaningful events, objects and experiences, the more elaborate their associated vocabularies. What effects do these variables have on individual thought processes? He quotes a number of interesting studies such as those done by Cole (1971) with the Yoruba people, whose language labels only 3 colours, the Lesu islanders who have about a dozen words for "pig"; and the Lo Dagaa who only have one term to code both "day" and "market". Of interest in this writer's research, the Zulu people only have one word to code both "blue" and "green". Eskimoes have many words for "snow" and Hananoo people, a large variety of words for "rice".

3.3.3 Psychology

Between 1910 and 1950 only a few psychologists used variations in culture as indicators of cognitive processes. During the 1960's the relations between language, thought and culture and also between culture and cognitive development were the focus of cross-cultural psychological research. The single most widely used theoretical context for cross-cultural research was Piaget's theory of cognitive growth. Unfortunately it frequently happened that the study of Piaget's theory has been confined to specifying quantitatively the age-lag of some specified "foreign" children behind European children as they move from one

developmental stage to another. Goodnow (1969), Price-Williams, Gordon and Ramirez (1969) and Bruner et al (1976) have all tried to identify the way in which some cultures "push" cognitive development earlier, longer and better than other cultures. A universal finding of this research is that the attendance at western-style schools enormously speeds up the development of problem-solving skills.

An important element to this theorising is that just as some cultural conditions accelerate the rate of development of all particular cognitive skills, the lack of certain critical experiences may delay or preclude development.

Many studies which have been conducted along these lines have attempted to specify the cultural variables that account for particular aspects of cognition. Although the enterprise is still in its infancy, say Cole et al (1971) it is potentially more fruitful than searches for any population difference that gives rise to a difference in test scores, with no accompanying effort to specify the source of the diversity.

3.4   TOWARD AN EXPERIMENTAL ANTHROPOLOGY

Gay and Cole (1967) admit to a confused approach in their research when they were faced with trying to understand African difficulties in learning Western mathematics. They describe the psychologist as being primarily interested in the study of various cultures in order to test the generality of hypothetical cognitive processes. These same authors state 2 concerns:

1.   We wish to study the relation between a person's home culture and the kinds of cognitive skills he develops. Ethnographic analysis sets a kind of endpoint of any analysis of cognition. Whenever psychologists' analyses suggest lack of competence, they must look to their

basic ethnographic observations to see if that same lack of competence is manifested in routine activities. If not, it could be that the analysis rather than the subjects, is incompetent.

2. Cole et al (ibid) reminds us that our work starts with certain western notions of cognitive process as embodied in various experimental tests, and we should not ignore the fact that the experimental method _is_ an important tool for understanding cognitions; and reject the conclusion that cross-cultural experimental research is useless.

The above researchers claim that no matter what measures a psychologist may take to make his experimental procedures clearly understood, his materials familiar, and his tasks straightforward, the very fact that he asks a member of a non-literate community to answer a set of questions or to seek a solution to a hypothetical problem, violates cultural norms. The researcher must avoid the danger of overgeneralising results to domains where they do not apply.

Just as an experiment is never a normal part of a subject's everyday life, so an observer can never become a normal part of a social group's everyday experience.

3.5 THE GENERALITY OF THEORIES OF HUMAN COGNITION

Curran (1980) asks "what is the ultimate aim of cross-cultural studies?" He looks at what such studies can contribute to cognitive psychology, and how different cultural factors may influence cognitive processes.

One of cognitive psychology's major questions is: how general are our theories and concepts of human cognition? The generality issue forms the basis of the current demand for cognitive psychology to have "ecological validity" - be

truly a study of the relationship between living organisms and their environment. General principles of human cognition must, by definition, apply more broadly than the particular subject population on which they were originally tested. This does not mean that we should only focus on the ways in which people are the same, but a general theory should be able to predict differences as well as universals in cognitive functioning.

Curran (ibid) maintains that, clearly, there is no more a culture-free man than there can be a culture-free test. Experimenters know implicitly their subjects' way of interpreting instructions, for example, because they share their subjects' cultural experiences. Only when they move outside their own particular culture does this dependence on cultural information become explicit.

Cognitive psychology seems to run the risk of creating an idealised "psychological man" who processes information in ideal ways. He maximally trades off speed and accuracy, makes logical errors, holds seven or so bits in short-term memory, and allows no non-rational processes to affect his performance. It is a mistake to view the problem-solving strategies of "psychological man" as being universal laws of human cognition.

A major attraction of cross-cultural studies is how cultures can function as natural laboratories, says Curran (ibid). Intra-cultural variation in factors which do not vary substantially in the west is another interesting field of investigation. As with many traditional societies in various parts of the world, some sections of the Zulu population are presently undergoing social change, some more rapidly than others.

Technological innovations have been introduced in some
parts, but not others; formal education is available for
some people but not all; nutritional programmes are being
carried out, but only in certain regions. Such societies
which are in a transitional state allow comparisons to be
made to assess the effects of such factors as schooling,
literacy, urbanisation and nutritional levels on cognitive
functioning.

Early cross-cultural studies carried out in the latter part
of the nineteenth century by people such as Boas (1911)
Tylor (1874) and Levy-Bruhl (1910) for example, tended to be
value-laden, and conclusions were reached about primitive
societies reflecting primitive mentalities; peoples whose
thought processes were deemed to be childlike and immature.
If we are to investigate the relation between culture and
cognition, we need to understand both parts of the system.
On the one hand, we are dependent on our psychological
understanding of cognitive processes and on the other we
require a detailed knowledge of culture. By looking at
culture as if it were a single, independent variable in
cognitive research, psychologists have grossly
oversimplified the issues involved. Cultures are dynamic
systems, not static structures. Curran stresses that
ethnographies provide an essential context in which to carry
out cross-cultural studies.

3.6 CHANGING CULTURES, CHANGING THOUGHTS

The conventional academic attitude assumes that skills are
taught in schools which are then carried away to be applied
in any situation which required those skills. Lave (1988)
for example, has begun to doubt the ecological validity of
experimental findings in cognitive psychology and to ask
what thinking is like in the pervasive contexts of people's
lives. Both empirical evidence and further analysis of
cognitive theory, she claims, provide a stronger rationale

for moving into the experienced, lived-in world as the site
and source of further investigations of cognitive activity.
Her research involved the analysis of one particular form of
cognitive activity: arithmetic problem-solving where she
moved the analysis out of the laboratory into the domain of
everyday life. Daily activities such as grocery-shopping
constituted the core of the study, and answers to questions
such as: Does more schooling lead to greater success at
solving maths problems even after many years? and; Do
differences in years of schooling have the same impact in
school-like maths tests as on grocery shopping, math
performance? were sought. In other words, it was cross-
situational cognitive continuity which was being examined.

In this type of research, the activity to be studied is
first located in the everyday activities of the participants
of the dairy workers (Rogoff (1984), navigators, bookmakers,
shoppers and vendors; i.e. subjects who routinely do what
the experimenters want to study. Lave's results challenge
the credibility of the theoretical framework that gives
centrality to learning transfer, and she questions the
adequacy of a normative view of the exemplary person as a
rational, professional scientist and problem-solver.

Curran (1980) refers to intra-cultural rather than cross-
cultural research and says it uses as its natural
laboratories, traditional societies undergoing rapid
cultural change. Vygotsky (1978) and Luria (1976)
maintained that, just as the tools of labour change over
history, so do the tools of thought; and just as new tools
of labour give rise to new social structures, so do new
tools of thought give rise to new mental structures.

Many researchers have taken advantage of societies
undergoing rapid cultural change and which have in a sense
speeded up the normally slower historical changes. In
South Africa the Third World societies have experienced
rapid industrialisation and we find parts of the population

which are literate, experiencing formal schooling and encountering technological innovations.

Scribner and Cole (1973) emphasise 3 main differences between formal education offered by Western-type schools and the informal education of everyday life:

a)   Schools take learning out of the context in which it is used.

b)   Schools put more emphasis on _what_ is being learned than _who_ is doing the learning.

c)   Language is the primary mode of transmission in schools, whereas much informal education involves nonverbal (eg. observational learning).

Some interesting findings illustrate the cognitive consequences of literacy. Non-schooled subjects tended to treat each instance of a related set of problems as a separate sub-problem and shows little evidence of "learning to learn" i.e. ungeneralised learning patterns were observed. Also, the way they solve problems seems dependent on whether the statements given to them with which they had to reason were subjectively considered to be true or false. Luria reported such results from his Uzbeki people in Central Asia.

When considering the effects of schooling on cognitive development, one cannot avoid examining what _kind_ of school is meant. A school in a prosperous First World city would appear to have little in common with a rural African school with one teacher and one class for children of all ages. Also the sample is likely to be unrepresentative because whereas schooling is compulsory in the First World society, parents in a Third World culture may select their children for schooling, keeping behind others as co-workers. Perhaps this explains why findings of studies on the the effects of schooling on cognitive development are far from consistent. What does emerge is that the more "westernised" the culture,

the more they perform like westerners on western experiments.

3.7   INTERPRETING GROUP DIFFERENCES

Curran (1985) refers to the "deficit approach" of interpretation where differences only become deficits when one has a norm or standard against which the performance of different groups is assessed. The norm is generally that of North American, middle-class whites. People in other societies might reverse the argument and claim that western society is "deficient" in training rhythm and dance, weaving, story-telling, altered states of consciousness, to name but a few (Gardner's (1983) Theory of Multidimensional Intelligence).

Having "diagnosed" a "deficit", it is argued that by adding the "missing elements" one can compensate for the deficit. De Lemos (1974) and De Lacey (1970) (quoted by Curran 1985) discuss this attitude and suggest that in the interests of optimal cognitive development, children from non-western or Third World societies should be introduced to environments which would help them achieve the same level of conceptual development as is found in children from Western societies. Curran (ibid) remarks that deficits and compensations are thus structured within an imperialistic research ethic which presupposes that "other peoples'" goals are, or should be, the same as Westerners' goals.

Curran (ibid) reminds us of the importance of bearing in mind, too, the issues of what is being classified, who is manipulating the materials, the subject's familiarity with the task and substances etc. A number of studies examining conservation abilities have caused Curran (ibid) to state that one is left with the conclusion that conservation responses are situation-dependent, and may have little, if any, meaning outside the experimental setting. Cole et al maintain that, in general, the more culturally familiar and relevant the situation, the more logical and analytical

their subjects' response to it.

3.8   SITUATIONAL DETERMINANTS OF COGNITION

Irwin and McLaughlin (1970) (quoted by Curran 1985) showed
that non-literate rice farmers are more adept at classifying
types of rice than at sorting geometric figures, and Cole et
al demonstrated that North Americans do not match Kpelle
when it comes to sorting forest and vine leaves.   Research
strategies which ask "How well can they do our tricks?"
(Wober 1969) before looking at how well they can do their
own tricks, can lead to unjustified assertions of
incompetence.

Curran (ibid) says that such findings question the whole
concept of using particular experiments to "diagnose"
whether people "have" or "have not" certain cognitive
processes.

Authors such as the Laboratory of Human Cognition (1969),
Flavell and Wohlwill (1969), Cole and Bruner (1971),
Scribner (19740 and Dasen (1977) assert that a person's
performance on a task does not always reflect his underlying
competence.   What a person does not do should not be taken
as an indicator of what he cannot do, as the competence may
require another situation in which to be expressed.

Fodor (1976) argues that cognitive development should be
seen as a decontextualisation of cognitive processes, and
Piaget (1972) himself stated that formal operational
thought, for Westerners, may be contextualised within
certain fields of expertise.   He proposed that people should
be tested in a field which is relevant to their career and
interests.

Discussing the possible necessity of developing a "theory of
situations" in order to deal with the problem, Cole and
Scribner (1974) advise that a major difficulty would be that
we cannot represent situations independently of the person

who is perceiving them or what that person's aims are.

Curran (1985) cites Neisser (1976) who describes perception and cognition not just as operations in the head, but transactions in the world, i.e. cognitive processes have a purpose, they are not merely mental structures. Cole and Scribner have used the Vygotsky-Luria concept of higher mental processes as being complex, organised, <u>functional</u> systems which are represented in different areas of the brain.

The components are combined in various ways depending on the task at hand. These components and their functional relations are formed during the child's development and are not present at birth. All these changes will be closely dependent on that unique child's social and cultural experiences. The functional approach does assume that how components are organised to meet particular goals will depend on situational factors.

Once again we are reminded of Cole's (1975) call for an "ethnographic psychology of cognition" where ethnographic data can be used to `check' experimental results so that when laboratory findings go against what is observed in everyday situations, these findings are questioned. Ethnographic data can be used to design experiments which are based on analogies to everyday problem-solving activities: i.e. having "<u>ecological validity</u>".

An important point made by Curran (1985) is that it is not enough merely to demonstrate that a group who does not use particular cognitive processes in Situation A does use them in Situation B. Simply documenting what people do and do not do in a multitude of situations can only produce a mass of unrelated data. We have to stipulate precisely what differences in those situations are crucial and why; what differences in those situations are causing the differences in behaviour.

3.9 GENERAL OBSERVATIONS

Wherever possible it is advisable to follow the strategy of multiple experiments which will emphasise patterning of results. As Cole et al (1971) advise, researchers of cognition will have to proceed on the belief that we are always dealing with normal human beings whose behaviour is organised and meaningful within its own natural context. When we encounter behaviour that appears inappropriate, disorganised or meaningless, such observations should be a starting point for inquiry rather than proof of inferiority. Studies involving cross-cultural investigation of cognitive processes will reflect the richness and variety of human thinking, whatever its cultural context.

Cole et al (ibid) also mention that in surveying the major summaries of research on the "culturally disadvantaged" (Deutsch 1969, Hellmuth, 1967 and others), it soon becomes clear that various minority groups are viewed as "victims" in which some have termed a "social pathology" model of cognitive development (S.S. Baratz and J. Baratz 1970). Conclusions are reached that minority-group membership results in stunted cognitive development. At present, say Cole et al, the social pathology view of minority inadequacy is dominant in the United States. The view taken by the above authors relies on observational and linguistic evidence to claim that the poor performance of minority groups on psychological tests, is the result of various situational factors. The Laboratory of Comparative Human Cognition (1971) was also a champion of this viewpoint. Cole et al (ibid) emphasise their major conclusion that cultural differences in cognition reside more in the situations to which particular cognitive processes are applied than in the existence of a process in one cultural group and its absence in another. Our task must be to determine the conditions under which various processes are manifested, and to develop techniques for seeing that these conditions occur in the appropriate educational setting.

The writer feels that the research described in Chapter 6 provided the basis for this important step. Whether classification and problem-solving skills would develop as a result of the intervention described in the research would also depend on a multitude of variables among them being motivation. Does it really pay off for a Black child to work hard in school?

Merely to demonstrate the existence of a particular cognitive process in a group does not solve the problem of the failure to transfer it into the classroom. The child must be taught _how_ to apply those skills in the classroom. In short, says Cole, we must continue ethnography and experimental psychology in the service of understanding the relation between culture and thinking.

This study acknowledges our ignorance of the multiple, systematic behaviour that gives rise to the criterion behaviour (in this case, classifying behaviour). It is accepted that we cannot unambigiously interpret the outcome of this study, but an attempt has been made to examine as fully as possible, the variables exerting an unevaluated influence on the cognitive task of classification, and the conclusions which flow from it. From Cole and Scribner's (1974) experience, the writer was alerted to scrutinise carefully the nature of the experimental tasks used in her study and to respect the ambiguities involved in drawing inferences from the subject's performance.

4. A REVIEW OF SOME STUDIES ON CLASSIFICATION SKILLS IN OTHER CULTURES

The hypothesis advanced by Okonji (1971) is that the difficulty with 'culture-free' and 'culture-fair' tests is largely the problem of the testee's familiarity with test materials. This problem has been particularly acute in psychological testing outside Western countries, especially Africa. In an effort to cope with the problem rather than merely show an awareness of its existence, Price-Williams (1962) used familiar indigenous objects for studying classification among the Tiv of Northern Nigeria. Kellaghan (1977) used local materials for the investigation of classificatory behaviour among some Western Nigeria Yoruba children. These studies showed for the first time that when appropriate test materials are used, the African children involved were not qualitatively different from their European counterparts in their abstract attitude.

Although the results of these studies are important, they do not throw any light on the nature of the effect of familiarity on test performance in different cultural groups. Some investigators have suggested a type of design that makes easier the investigation of systematic differences across groups. Okonji (1971) describes this procedure as involving stimuli to which no differences in response should be expected and those to which differences should be expected. The study he describes involves a sample of 138 Ibusa (Nigeria) and 105 Scottish (Glasgow) male schoolchildren, ranging in age from approx. 6 - 12 years.

4.1 RESULTS

The results of the tests were analysed mainly on the basis of performance and verbalisation. The ability to "shift" one's bases of sorting in a sorting task is considered indicative of the degree to which an individual possesses

classificatory ability: "a change of criteria or "shifting" is simply another expression of operational and therefore reversible mobility, this being the hallmark of a complete classificatory structure" (Inhelder and Piaget 1964).

In Okonji's study, a shift was considered to have been made when a subject broke up the groups he had formed and then formed more groups following some other different basis.

Results were analysed on the level of verbalisation that took place during testing, the degree of accuracy of sorting and the number of shifts in the animal sorting. The results presented only moderate support for the hypothesis, indicating that familiarity has only a moderate influence on classificatory behaviour. Okonji refers to Price-Williams (1962) results (discussed later) and notes that the Ibusa and Glasgow subjects made relatively fewer shifts than in his research. Price-Williams suggests that the Tiv children seemed to lag a little behind their European counterparts in classificatory skills, but there are many variables to take into account and Poole (1968) is right in cautioning us against "assuming that because one test has been modelled on another, or inspired by it, the results may be validly compared".

Okonji argues that (although his statistics do not support his hypothesis wholly), when tested on appropriate, i.e. familiar materials, no differences may be found between a western and a non western sample in classificatory attitude.

It is noteworthy that Okonji found that 25% of the Ibusa sample in his study classified the animals on the basis of colour, while none did in the Glasgow sample. Many reports of psychological studies in Africa have observed this dominance of colour in classificatory activities.

Schmidt and Nzimande (1970) undertook a study concerning Colour/Form preference and Classificatory Behaviour in rural Zulu children, with and without western-type schooling, from literate and from illiterate Zulu urban workers and from illiterate urban workers. Significant differences were shown between children in school and those not going to school, between literate and illiterate urban workers, between illiterate urban and farm workers.

Previous research had shown that in classification tasks, there is a shift from colour preference in the pre-school years to form preference in older elementary school children. This is regarded as normal in European and American children, and will be discussed later in the interpretation of the writer's own study. Bruner, Olver and Greenfield et al (1966) and Gay and Cole (1967) pose questions about the generalizability and the interpretation of data on classification ability obtained from western-type cultures. Bruner and associates used methods in their studies which used colour, form, size and number as alternative criteria for grouping, whereas Schmidt and Nzimande used colour, form, size and number. Both these studies were concerned with the impact of western-style schooling and or urbanisation on cognitive development.

Gay and Cole's (1969) research in Liberia showed that Kpelle children and adults have great difficulty in coping with classification tests that Western children usually find quite simple.

Suchman (1966) tested Moslem Hansa children for form/colour preference in classification tasks. If on the first sort, the Subject used colour as the criterion, then he inferred colour preference. Later sorts gave information regarding subject's ability to classify i.e. to identify or abstract other criteria suitable as a basis for classification.

Schmidt and Nzimandes (1970) study, the hypothesis was advanced that:

On ability to sort according to more than one criterion, rural Zulu children with schooling will be superior to rural Zulu children without schooling.

Schmidt and Nzimande's findings were that rural children without schooling showed overwhelming incidence of colour preference while Zulu children with schooling (however poorly equipped and with ill-trained teachers) were, even on the first sort, making use of alternatives to colour as criterion.
Similar conclusions were reached with the Wolof and the Hansa studies on unschooled subjects:
"colour groups increase with age; the use of form and functional attributes is virtually non-existent at any age" Bruner et al (1966).

Schmidt and Nzimande conclude that schooling is a powerful agent for changing the direction in which the course of human cognitive development will flow.

Cole, Gay, Glick and Sharp (1971) regarded the study of classification ability in cognitive anthropology to be a keystone. They chose to concentrate on the classification of natural word objects in the Kpelle (Central Liberia) tribe.

They point out that an understanding of basic categories is necessary for the interpretation of concept-learning experiments. A factor that is important in cross-cultural experimental study is the possibility that an accepted classification in one culture is not recognised in another. For example, if an Anglo child classifies an eagle as a land animal, he would be considered wrong, but not the Osage Indian child. A psychological experimenter had best understand what categories are used by his subjects.

Experimenters Gay at al (ibid) in their work with the Kpelle
tried to examine the relation between the way things are
classified in verbal behaviour and the classifications which
occur when objects are presented for classification. They
also sought to find out the difference in performance on
cognitive tasks between those Kpelle people with and those
without the experience of western schools.

It appeared that in the Kpelle study, fairly stable class
groupings were identified with seemingly well-defined
relations of subordination and superordination. Alternative
groupings were found, from consideration of different
attributes of objects at different times. Gay et al felt
that they had demonstrated to their own satisfaction that
the Kpelle know and use taxonomic class relationships to
structure their verbal behaviour. But they also established
that the use of this kind of structuring is neither
universal nor obligatory. The question they asked then, was
how do cultures lead people to adopt different kinds of
classification systems under different circumstances? and:
under what circumstances do classification schemes enter
into various situations where the subject is required to
learn something new? They stress throughout their work the
vital importance of prior ethnographic study of the people
with whom one wants to conduct psychological experiments.
This facilitates the adaptation of test instruments.

These authors remind us of the psychologist's conviction
that tests measure process, being often ignorant of the
kinds of adaptive, intelligent, situation-specific
performance described by anthropolgists who continue to
believe in psychic unity of man.

Cole et al points out, although the skills may be available,
for some reason the experimental task situation does not
trigger their use. If experimentation leads to results
incompatible with ethnographic analysis, the experiment was

probably culturally inappropriate. Experimental work and ethnology must interact, each approach setting standards for the other to maintain.

We are also reminded that different cultures provide for different learning experiences (eg. Kpelle people are skillful at measuring rice, but not at measuring distance, river people are adept at using a complex natural compass, but cannot perform a standard psychological test).

The tasks that a culture poses for its members will be the ones with which they deal most effectively.

Cole et al mention the major importance of finding out about the learning environment of the young child. This emphasis caused the writer to investigate the games played by Zulu children since Cole considered that information to be of key importance in studies of cross-cultural cognitive psychology.

5. TRADITIONAL CUSTOMS OF THE ZULU PEOPLE REGARDING THE REARING OF CHILDREN

This study attempted to be Culture Sensitive, i.e. to take account of the sociocultural context of the Zulu children who took part in the research. Therefore it was necessary to examine both the rural and the urban lifestyles of the two communities from which the samples were drawn. In addition, the set of tasks used in this study were designed to try to avoid the "importation" strategy whereby tests designed for western European children were often used with people of very different cultures without adaptation. An honest attempt was made to create items which would be known in the children's community and background experience.

A visit to a rural Zulu community in Northern Natal where the writer spent a day in discussion with the members of the group, provided some first-hand and up-to-date observations in a traditional setting which are described in Chapter 5.4.

Unfortunately the above group was too small to provide enough children of the required age for testing for this study and so the sample was drawn from a similar, though larger group in another geographical area, described in Chapter 6.

In this Chapter, then the above issues will be examined because it is part of the search for culturally specific modes of learning and thinking and part of the effort to address such concerns as the integration of Zulu children into the Western-European-type education system.

5.1 CHILD-REARING CUSTOMS

It would be beyond the scope of this study to present a detailed account of how urbanisation has affected Zulu traditional customs. It is accepted that here, a rather superficial account will have to suffice.

Krige (1950) described the development of the tribal Zulu from childhood to adulthood and says the process is not, as among Europeans, one of gradual, almost imperceptible change, but consists rather of a series of clearly marked steps, each of which brings with it increased status and greater responsibilities. At the ceremonies marking the transitions to another stage, all the people of the same age as the initiate must be present and they play an important part. It often happens that collective ceremonies occur and so a strong feeling of group cohesiveness develops among young children.

A great deal of time appears to be spent in ensuring that various taboos, rules and rituals are observed, both prior to, during and after the many ceremonies. These include avoidance of certain foods, refraining from certain behaviour (eg. sexual intercourse causing one to become "unclean" and therefore not able to come into contact with the group of children who have had the "qhumbuza" or ear-piercing ceremony), slaughtering of animals, not speaking to specific persons and only sleeping in certain parts of the kraal. Articles of dress too, are highly meaningful such as ibeshu and isinene (front and back loin flaps).

Traditional dances and songs would play a highly significant role in the lives of young Zulu children. Important ceremonies like recognition of puberty involve singing and dancing as well as rituals involving the slaughtering of a beast to honour the ancestors. Special parts of the animal will often be offered for the enjoyment of the spirits who are asked for their blessing. Dances and songs celebrate special occasions like marriage, birth, death, harvests, hunting expeditions, welcoming of visitors, saying farewell to guests/loved ones.

This then, is a brief review of the child rearing customs generally found among traditional rural Zulu people.

Because the child's environment includes people and physical objects, it had been important to consider the growing up and games of such a child. The prerequisites to thinking and thinking skills develop as an integral part of the child rearing practice within a given culture. In families affected by some degree of urbanisation, the physical and human environment can undergo considerable changes. The adults are confronted with new situations for which they have not been culturally prepared. The interaction of the child with his caregivers suffers and the mother's interaction tends to be reduced to the satisfaction of the child's physical needs only. The prerequisites to cognitive skills are poorly developed, thinking and feeling are not well-differentiated and they tend to react to the environment instead of interacting with it. Rautenbach (1985) refers to this behaviour as being "externalised". Frankenstein describes them as "secondary retarded". Where such secondary retardation occurs widely in a community, no education system seems to be able to be effective. The fundamental problem of secondary retardation must be addressed first.

Bernard Malinga (1942) compares the effects of rural and urbanised lifestyles on the developing intelligence of young children. He describes the young Zulu child in rural areas growing up in an environment where his father, the chief and his dead ancestors are the ruling triad. Any departure from the ways of the tribal ancestors was an implied criticism of these ways and so it is clear that this environment is a simple one and cannot, says Malinga, promote that mental alertness which is characteristic of children who live in a more stimulating environment. Zulu children in the primary schools are poor in arithmetic because their home environment affords them only an opportunity of counting

stock. Because of the simplicity of their environment, and
the ordinary routine of the kraal, no special skills are
required and hence mental alertness does not exist. Many
Zulu children do not go to school or they attend
sporadically and they find that environment so alien that
they spend much time trying to adjust themselves.
Writers such as Bruner (1985), Sylva, Roy and Painter (1981)
have alluded to the Vygotskyan theory of peer collaboration
and peer tutoring, but they are of the opinion that this
alone is insufficient for cognitive development: the
intellectual value of peer interactions is enhanced when
there is a model (either in the form of a teacher or an
adult, or a peer who already "knows" (how to ..., what, when
to ... etc)), so that the children may observe the kind of
interaction required and then proceed themselves. The
children Malinga describes would seem to be lacking this
vital link.
Malinga says:

> "...although completely adjusted to his own more
> natural and therefore simpler environment which does
> not demand higher forms of thought and which does not
> present such intricate situations as are common in
> schools, is less adjusted or adjusts himself less
> rapidly ... to a school situation which demands higher
> mental functions" (p 10).

Those children whose experience includes mission stations,
have a decidedly advanced mental outlook over their tribal
brothers, claims Malinga (ibid). Yet conflict exists
because too often in these schools the pupils are taught to
look down on the old life and what was formerly sacred is
branded absurd superstition and what is a religious reality
(ancestor worship) to his parents is regards in the school
as non-existent or the work of the devil. This would appear
to create a great deal of conflict.

Interestingly Malinga says he believes it is a good thing
for Europeans to discuss the old beliefs for if the Zulu
children must acquire the White Man's education, they must
do it spiritually, mentally and physically. Since this was
written over 40 years ago, and there has been a resurgence
of Zulu interest in his own culture, one wonders what
Malinga's thoughts would be now on the matter.

Regarding the urbanised Zulu, Malinga describes the working
mother as typically having not much time to devote to
playing with, talking to and intellectually stimulating her
young children. The father either is absent or does not see
the necessity of involving himself in this way, since the
children are the time-honoured responsibility of the mother.

He says that most parents cannot provide the link between
the school and life of the outside world which is needed to
make school education effective. This demonstrates a
crucial Vygotskyan concept: that of the influence of the
"tools" of the culture into which the child is born. Among
the urbanised Zulu we frequently see the break-down of the
traditional culture.

Contact with other nationalities in towns elevates the
mental outlook of Zulu children and their English is
improved. Of course, Malinga wrote before the advent of
Television in South Africa which must certainly be exerting
a great influence in the more affluent urbanised Black home.

In poor urban environments where children are constantly
left to their own devices, Malinga says "no education worthy
of the name is possible" (p 29) and mental as well as
physical development is retarded.
Frequently older children are kept out of school to act as
guardians for the younger ones while the mother is at work,
or sent out themselves to supplement earnings. Poor diet,
unsupplemented by wild fruits and vegetables, take their

toll, both physically and mentally. It is not possible here
to discuss the ill-effects of poverty, crime, malnutrition,
overcrowding and political unrest. Suffice it to say that
they are all found in the environment of the urban Zulu
child unless he lives in an affluent Black suburb.

5.2   GAMES PLAYED BY YOUNG ZULU CHILDREN

Bruner (1985) raises the question about childrens' play as a
form of metacognition. He states that there is evidence
that by getting children to play with materials that they
must later use in a problem solving task, one gets superior
performance from them in comparison with those children who
spend time familiarising themselves with the materials in
other ways.

Play, says Bruner, is _the_ business of childhood. He wonders
whether play isn't quite different from work (as in the
classroom particularly) by which he means the classical
model of problem-solving with the goal held constant and the
means varied.

In recent years there has been a great deal of interest
among scholars of many disciplines in the "real activities
of real people" Cole (1985) - the necessary starting point
of analysis. Therefore it is productive to examine some
typical games played by young Zulu children.

The free, open air life of the Zulus makes for a childhood
with few restrictions and parents are not too strict on
their children, writes Krige (1950). Their activities, from
an early age revolve around helping their parents working.
Small girls may carry water, hand seed during sowing, hoe
and fetch wood. They would learn the art of fire-making and
cooking, too, by helping their mothers.

Small boys from the age of four or five herd goats and calves and later might accompany the father to the kraal and help with the milking. When he is a little older he would go out with bigger boys to herd the cattle all day.

Vygotsky (1933) notes that is is impossible to ignore the fact that the child satisfies certain needs in play. Towards the beginning of preschool age, when desires cannot immediately be gratified, the child resolves the tensions by entering an imaginary, illusory world in which the unrealisable desires can be realised and this world is what we call play. Imagination represents a specifically human form of conscious activity. While wish fulfillment, as Vygotsky describes it, may be the theme underpinning play in many situations, it also seems that much of the play among the older Zulu children is more an imaginary situation which fulfils a very practical purpose - i.e. that the children are "rehearsing" for real life occurrences later on, or practising skills which will be useful to them as adults. But Vygotsky is at pains to distinguish between the preschoolers' play and that of the older child whose play becomes a more limited form of activity.

While describing the Zulu child at play it is also of interest to note what Vygotsky (ibid) has to say about the situational determinants of play. He quotes studies by Lewin which conclude that things dictate to the child what he has to do, and so extensively determine the child's behaviour. Perception is a stimulus to activity, so it is understandable that with her consciousness so structured, the child is constrained by the situation in which she finds herself. Gradually, as she grows older, she develops the ability to act independently of which she sees. This is a long process.

The creation of an imaginary situation is not a fortuitous fact in a child's life, but rather the first manifestation

of the child's emancipation from situational constraints and this is found just as much in the Zulu preschooler as in a child of western culture.

Vygotsky maintains that play actually creates a zone of proximal development of the child. In play, a child always behaves beyond his average age; (although one presumes Vygotsky is referring to children who are not emotionally disturbed) above his daily behaviour; and play contains all developmental tendencies in a condensed form and is itself a major source of development.

From the point of view of development, creating an imaginary situation can be regarded as a means of developing abstract thought. . The corresponding development of rules in childrens' play leads to actions on the basis of which the division between work and play becomes possible, a division encountered at school age is a fumdamental fact. Serious play for the very young child means that he plays without separating the imaginary situation from the real one. At school age play does not die away, but permeates the attitude towards reality.
Superficially, play bears little resemblance to the complex, mediated form of thought and volition it leads to, only a profound analysis will reveal its role in cognitive development.

Despite the chores they are obliged to do, Zulu children do not work all day, they also play. In her observation of play among Zulu children, Krige (ibid) finds a close resemblance between these games and those common among European children. Not only do they make and play with clay oxen and people, but they enjoy skipping with a rope of skin or grass; a somersault game and even a form of "touch". She describes "Ngehtshe" and "Khobola" which are games played with stones, a kind of juggling in which a number of stones are held in the hand while another is tossed up and caught in the same hand.

The Zulus' love of music and dancing is shown in the number
of games with musical accompaniments and dancing and jumping
games they have. Krige (ibid) describes a favourite musical
past-time in which children draw certain figures consisting
of lines, rings etc. on the floor of the hut after which one
of the girls, having noted the positions of the figures,
covers her eyes with one hand and in a pretty minor song,
replies to another of the girls. The latter, pointing to
the first of the figures as they stand, inquires in a
similar singing tone "Ngibuza" (I ask what it is). There
are three varieties of figures and three different replies.
If the girl, through forgetting the relative positions of
the figures, sings out an unsuitable reply, she has lost the
game.

"inKanklelana" is a kind of dancing game in which children
turn to each other, grunt, screw up their faces and twist
their bodies about and then turn away before repeating the
movement. There are a number of games involving hopping,
kicking the heels on the buttocks and chanting.

Some of the games popular among children are tests of
knowledge or dialogues. Krige describes one game where
children place a row of mealie grains on the floor of a hut,
supposed to represent different birds. The mass of children
form a chorus, singing in a minor key, the refrain "Bula
msense" (clever fellow). Then one child will point to a
grain and reply in a similar tune "very well, the one among
the calves, the yellow finch, a very fine looking fellow".
The child must be able to think of as many birds as will get
him through the whole row of mealies, or each in turn may
name a bird until no-one can mention any more and then the
one who has named most is the winner. This game is played
with regard to animals and grasses, too.

Another common game called "nCikikane" is to count the
fingers of both hands, beginning with the little finger of

the left hand and calling each by its proper name, one, two and so on.

A popular game among younger boys is sticking aloe pods. The pods are placed in the ground in the shape of a herd of game, while the contestants squat around holding sharp sticks about 15 cm long. These are held between the fingers of one hand and flicked at the pods, the winner being he who hits most pods.

The older boys enjoy stabbing the "intsema" which gives excellent training in exactness of aim. A large spherical tuber is rolled down a slope while the contestants armed with sharp sticks, hurl them at the "intsema" while it rolls down the slope. Whoever first fixes it with his stick is the winner. This is often played as a team game.

Children also quite frequently play at casting lots and a number of methods are used. Two boys grasp a stick hand over hand until the top is reached. The one to whom the last place falls, must hold the stick swinging between his forefinger and thumb while the other, with a jerk, endeavours to throw it from him. If he succeeds he is considered the victor. Another way is for one boy to break up a stalk of grass into many pieces and for the others to guess how many pieces there are.

Zulu children are adept at creating "toys" and objects of play, the best known example being the cars and vehicles made of wire which are seen in even fairly remote tribal communities. This would be considered by Vygotsky as a striking example of tool use, which he wrote, could be seen in the play activity of even the poorest children who do not have access to prefabricated toys but who nevertheless, are able to play house, train and so on with whatever resources are available to them. This is a recurrent theme in Vygotsky's writing for he sees play as the primary means of childrens' cultural development. If one changed the tools

of thinking available to a child, his mind would have a radically different structure, he claimed.

5.2.1 Pedagogical Possibilities of Games in Africa

The theme of a Conference of the World Confederation of Organisations of the Teaching Profession (WCOTP) held in Swaziland in September 1987 was "Pedagogical Possibilities of African games and Cultural activities". Presentations were made by representatives from eight African countries (including Mocambique, Zimbabwe, Botswana and South Africa) and participants were interested to discover how the same types of games seem to be played with very little variation, from one country to the other.

Participants sought to answer the following questions:
* What are the major characteristics of African traditional games?
* Which are the major cultural activities prevalent in the sub-region?
* What would be the specific pedagogical values of the games and cultural activities?
* How best can these pedagogical potentials be exploited?

All the above issues are relevant to this study in its investigation into the development of classification skills in rural Black children, although the focus here differs in that we are not seeking to exploit these games for pedagogical purposes. This is perceived as a very interesting follow-on to this work however.

Pai Obanya (WCOTP Programme Co-ordinator for Education) points out that Africans are starting to ask questions about how school education can be linked as closely as possible with the rich body of knowledge and skills that exist outside the walls of school. Also, to what extent is the learner's school-engineered experience relevant to his

psychological needs and his social and physical environment?

As Africans become more concerned with the quality of education, they think more of its having a strong cultural and practical base and orientation. Obanya says "An important mine to dig into for more relevant and quality education is Africa's rich cultural heritage". A very important aspect of this is traditional games. Since these are not isolated events, it is important to see them as part of the African's overall manifestation of his cultural beliefs, and his societal activities. Erik Erikson (1977) has commented that research has shown that the most creative people were those with the least separation in daily life between work and play. (California Growth Study). Bruner (1985) is of the opinion that play at its best, may be an early prototype, an external prototye of internal metacognitive activity in the more mature.

A significant point is that Africans acknowledge that in their societies, games are closely related to the demands of the immediate environment. Hunting communities play hunting games, riverine communities play swimming games. Very importantly, all persons participate in these games which are supposed to be mastered by all individuals in a particular group. Odd persons-out do not exist, i.e. the factor of group play is an integral part of the games, the stress on individuals is lacking; each performer has specific roles to play within the group. African games are mastered and internalised to enable each person to communicate with his peer group, to allow him to adapt to his society, they contribute to enculturation.

At this point it is interesting to record Bruner's (1985) description of the four conditions that increase the richness of play. In view of what has been said above, this provides a different perspective from that of African people.

Bruner discusses the four important requirements thus:

a) The presence of <u>one</u> other child as a playmate (no
   more, no less). This is because two children in a
   shielded situation in which they can exchange rules etc.
   results in longer and more elaborate bouts of play, than
   where the child plays alone or in a large group.
   Generally the Zulu child plays in a bigger group.

b) Material that has structure eg. puzzles, building
   blocks, miniaturised versions of life activities,
   provoke longer and richer play bouts. Zulu
   children have no access to the former but versions
   of life activities are an integral part of many of
   their games.

c) Play bouts are longer and richer among young
   children when there is an adult nearby who is
   buffering the situation, i.e. being a source of
   stability in the situation. This is very often the
   case among the Zulus as the children do not often
   play away from the kraal, unless they are older.

d) The final condition for good play is a model of
   what is possible, i.e. high-level activity shown to
   them.

A most notable point is made by the representatives at the
WCOTP Conference concerning toys. Modern education places a
great deal of emphasis on the use of toys and in the African
cultural setting, even in the urbanised society, toys are
made <u>by</u> the child and not simply <u>for</u> the child. There is
much improvisation from materials existing in the immediate
environment.

As far as the sporting type of games played by Zulu children
are concerned, they are often "foreign", (eg soccer,
volleyball, track and field events) and it is probably only
in the most remote areas nowadays that only traditional
games are played.

Two games which are played by Zulu children which are
relevant to this study are "Ngubeshu" and "Upuca". These
will be described briefly:

Ugubeshu

This may be played by two or more players and may be played
on the ground floor. Three squares, one rectangle, two
squares and one half circle are drawn thus:
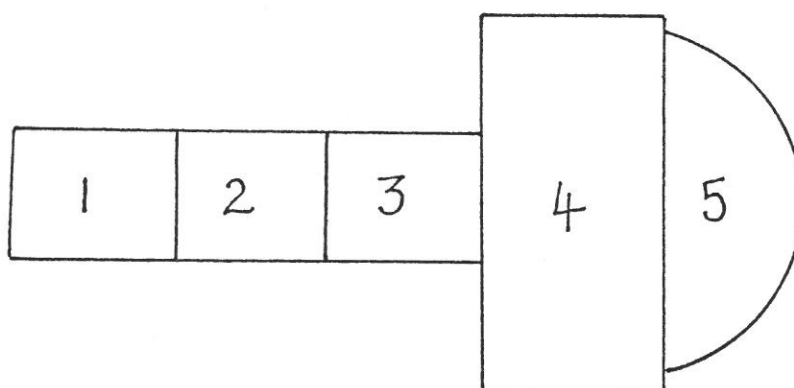
Method
1. A flat stone is thrown into (1).
2. Player hops into square and kicks stone out without
    touching line.
3. Player throws stone into (2), hops into (1), then
    (2), kicks stone into (1) then out, always without
    touching margins.
4. Continue as above until (1)-(5) have been used.
5. Hop through all areas with stone placed on back of
    palm, on reaching semicircle, rest; continue back,
    at rectangle landing on both feet; hop back to (1).
6. With eyes closed, enter all compartments asking "Am
    I in?" To the reply "Yes", continue. On "No",
    player falls out.

This game shows that the children would be familiar with
basic geometric shapes. There are variations to this game.
Such a one is "Mkoko'. Here a more complex structure is
drawn on the ground:
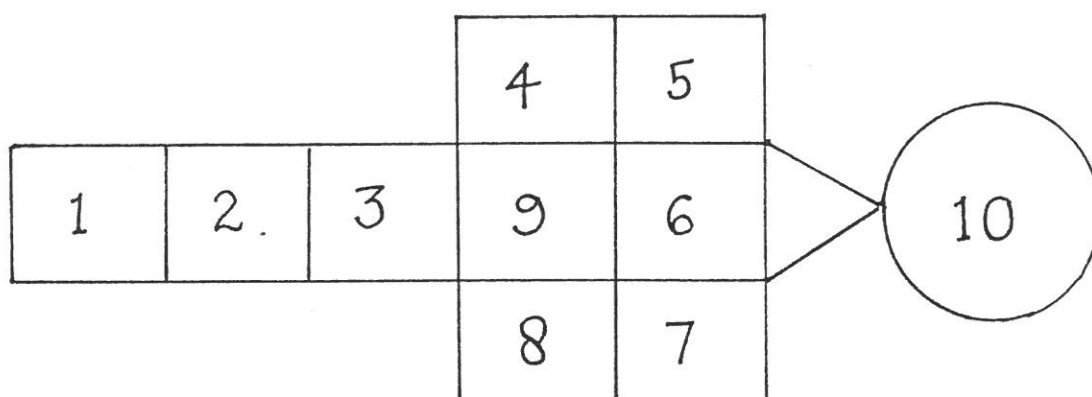
The rules are slightly different but essentially the game involves the same kind of procedure. In the drawing of the structure the children would be familiar with the geometric shapes of square, rectangle, triangle and circle.

Upuca

This is a stone throwing game, generally played by two or four players.
1. Dig a hole and place in it at least twenty small stones about marble size.
2. Throw a single stone up into the air and scoop out all stones. Catch pebble/stone before it falls to the ground.
3. Throw pebble up, return stones to hollow in the ground, leaving one stone out. Catch pebble before it reaches ground.
4. Repeat as before, leave two stones out.
5. Repeat, leaving three out.
6. Repeat until pebble falls, or player fails to leave correct number out.

The game "Nhodo" is a variation of "Upuca" and is described by O.P. Ndawi of Zimbabwe. In this game, only ten stones are used and players must systematically take out all the pebbles from the pit and then return them by alternately

pushing in (or picking up and then placing in) different
combinations of numbers of pebbles depending on the stage of
play i.e. 2 at a time, 3 at a time and so on.

An anaylsis of Upuca and Nhodo would suggest the
understanding of the basic concept of sets or groups. For
example, at stage two of the game, the player must
understand the concept 5 sets of 2 = 10 and at stage 3 that
there is an isolate i.e. (3 sets of 3) + 1 = 10

        The concepts

        10 sets of 1 = 10

        5 sets of 2 = 10

        (3 sets of 3) + 1 = 10

        (2 sets of 4) + 2 = 10

        2 sets of 5 = 10

        (1 set of 6) + 4 = 10

        (1 set of 7) + 3 = 10 etc. are mastered

Quite high-level concepts are hidden in this game, since one
is also having to consider various groupings of the stones
which one could pick up, eg. which four stones to gather if
one is in stage 4, so that the remaining stones are
favourably placed for ease of collection while the larger
pebble is airborne. Some players play a "touch-me-not" game
where one is not allowed to disturb the other pebbles except
those he is picking up at that time.

5.3 MAIN FEATURES OF TRADITIONAL AFRICAN GAMES

Traditional African games tend to be musical and rhythmical
in character. Sex and age often determine the kind of game
an individual may play. The equipment used in playing the
games reflects the creative ability of the group as it is
taken from its immediate environment. A way of life of a
particular community or group is depicted in the games.
Often, time and environment are important factors, since
some games are played at night, under the moonlight; during
the day; in the field, in the mountains or even during a

particular season of the year.

Finally one might say that some of the games played by young Zulu children would be conducive to the development of classification concepts but that it is the generalisation of these concepts into the context of formal education that is the critical issue. The playing of games in African society is seen as largely part of a cultural activity complex, a recreational past-time developing comradeship and co-operativeness among the group. Games are seen more as opportunities for self-expression through activity, for enjoyment and relaxation. It would appear that games are not used as deliberately for pedagogical purposes as we find in First World societies.

Reynolds (1983) describes her observations of play among the children of under 10 at Crossroads and although she studied urban children, she found that, like the rural child, a striking feature of their play was the ingenuity with which materials found in the environment were put to use. She noted particularly the myriad uses of sand; the child only had to squat, and the medium was at hand. Sand was moulded into homes, constructed into roads, shaped for cakes and thrown at an enemy! Cars made of wire varied in degree of intricacy. Many games were observed similar to those already described, such as Ugquaphu (hopscotch with a number of variations of rest squares and manner or order of throwing the stones); Uchiki (similar to Upeka described earlier). It was found that girls played more frequently than boys and that they performed more successfully on the Piagetian test of conservation of discontinuous quantities when a variation of the test was given using stones and holes in the ground. This is interesting because it supports the oft-mentioned idea of "contextual" cognitive functioning. Reynolds comments that the advantage of the game in learning to use numbers is obvious. She says "I never saw a teacher make use of its potential" (p 159).

She also mentions Upopi which is doll-play, indulged in by girls and notes that frequently items such as plastic bottles, sticks and other objects were used as dolls which were strapped onto the girl's backs with a cloth. This practice has been observed by the writer among rural children when mealie cobs were seen used as surrogate "dolls".

One could say that this is a good example of the Vygotskyan idea of the relationship between perception and meaning in young children. He says that a divergence between the fields of meaning and vision first occurs at preschool age.

In play, thought is separated from objects and action arises from ideas rather than from things: a piece of wood begins to be a doll and a stick becomes a horse. This, says Vygotsky, is such a reversal of the child's relation to the real, immediate, concrete situation that it is hard to underestimate its full significance.

Play provides a transitional stage in this direction whenever an object (for example a stick) becomes a pivot for severing the meaning of horse from a real horse. The child cannot as yet, detach thought from object. The child's weakness is that in order to imagine a horse, he needs to define his action by using "the-horse-in-the-stick" as the pivot. This is a crucial point in the cognitive development of the child.

5.4 FIELDWORK CONDUCTED IN KWABEKITHUNGA (ZULULAND) 1989

The writer investigated child-rearing customs among the Zulu people in the KwaBekithunga area near Eshowe in Zululand. This group leads a life similar to that from which Sample A children were drawn namely, the rural people near Estcourt, Natal. Some KwaBekithunga children attend a local Black school and there is a trading store close by. Radios and bicycles are reasonably common, but otherwise the tribal

customs remain largely intact. Tribal dress is mostly worn
and no English is spoken.

Through a sociable kind of discussion method the author
sought to find out whether these people differed much from
those described in existing literature on the customs of
Zulu people. It appeared that in essence, certainly as far
as salient points are concerned, the following is true.

5.4.1   Learning

Among the Zulu rural folk, formal education as we know it
does not exist. Children learn through observation,
imitation, experience, modelling and play within the
confines of the daily life activities of the kraal eg. the
girls learn to weave baskets and mats, do beadwork and make
clay pots by watching their mothers at work. They learn to
make mahewu and grind corn, to gather firewood and prepare
food by helping the older women in these activities.
Everything they learn has a meaning; it is immediately
useful and it is learned within the situations where it will
be used.
While imitating their elders in culturally patterned
activities, the children generate opportunities for
intellectual development.
Vygotskyan theory would hold that initially their games are
recollections and re-enactments of these real situations;
but through the dynamics of their imagination and the
recognition of implicit rules governing the activities, they
have reproduced in their games, children achieve an
elementary mastery of abstract thought.
Boys have certain lessons to be learned too, and the herding
of cattle and other livestock is not taught officially, but
is simply carried out together with the older boys. Details
about cows being in season, calves being born and the
multitude of information about animals is passed on
situationally and in an informal way, through speech.
Vygotsky's ideas on the social origins of cognition are
relevant here, where he says that the very means (especially

speech) used in social interactions are taken over by the individual child and internalised, and lead to the development of his abilities in problem-solving, memory etc.

5.4.2 The Sangoma

It is interesting to note that a more instructional type of learning occurs when the individual recognises the calling to become a "sangoma" or spiritual medium. That individual has formal instruction and has to learn the special skills and knowledge of the tribal healer. It is said that these people possess a high intelligence.

5.4.3 Schooling

The chief at KwaBekithunga allows the children of the kraal to attend the local "European school" willingly, but if the needs of the people are such that the youngsters are required at home, they are withdrawn from school for however long he deems necessary. The needs of the community are paramount. In addition, as soon as a girl starts to menstruate, she returns to the tribal kraal and takes up her place as a marriageable "intombazane".
Her education at the western type school ceases. Furthermore it is considered vital that she has mastered the skills of womanhood. Childcare and childraising are seen as communal activities and the development of the individual is subordinate to the welfare of the group. What is learned is completely relevant to daily life.

5.4.4 Relevant theories

Gardner's (1988) theory of Multidimensional Intelligence was found to be of relevance during this investigation. He talks about seven distinct "intelligences": Linguistic, logico-mathematical, spatial, musical, bodily-kinaesthetic and inter-personal and intra-personal intelligence. Gardner believed that individuals will develop certain intelligence far more than others. Certainly some cultures will consider some more important or desirable than others and will

nurture and foster them. It was the writer's opinion that the people of KwaBhekithunga could be said to concentrate on the latter three intelligences which was especially interesting when it is remembered that First World western societies have tended to develop the first three often to the neglect of the latter mentioned.

Sternberg's Tri-archic model of Intelligence came to mind during discussion with this Zulu group, especially the Contextual Sub-theory which emphasises that intelligence always refers to real-world behaviours that are valued by individuals in a particular culture.

It would seem that the Zulu child's behaviour is indeed purposive adaptation to his real world environment, indeed his very survival depends upon it. His environment does not stress intellectual attainment for employment opportunity as would the more urbanised life-style. Therefore actions taken by the children at Kwa Bekithunga could be taken to meet the demands for tribal survival and therefore deemed to be intelligent behaviour. Sternberg mentions, for example, that intelligent individuals living in North American society might seem quite inept according to the standards of intelligence in African tribal societies. In fact, in South Africa it would not be inaccurate to suggest that there is a poor fit between the long-term goals of the tribe of Kwa Bekithunga and those of say, the sophisticated and westernised black people. This makes the plight of the children of such a tribe more acute.

The children were observed by the writer during singing and dancing activities. Toddlers clapped and stamped with the older people, glancing frequently at the movements of their elders and attempting to imitate them. Even very young children showed complex footwork and clapping rhythms having had no formal "teaching" at all.
The mother explained that they never actually instructed their children in musical rhythm or dance steps. When asked

how children learn this, they replied: "They watch and practise and gradually it comes to them".

The contrast between such a learning environment and the classroom is striking. In school lessons say Foreman and Cazden (1985) teachers give directions and children nonverbally carry them out; teachers ask questions and children answer them, frequently with only a word or a phrase. The only context in which children can reverse interactional roles with the same intellectual content is with their peers.

The people of this kraal displayed the oft-noted politeness and delicacy of remark of the Zulu people who are renowned for their tact, and highly developed interpersonal intelligence which is engendered in the infant in his exceptionally close bond with his mother.

5.4.5 Peer Interaction

Counting is also learned through a kind of absorption process and specifically through playing of games. In their play, the children project themselves into adult activities and rehearse their future roles and values. This has been discussed elsewhere in this study. Suffice it to say that the children of Kwa Bekithunga play all the games already described, with minor variations and are familiar with concepts of circularity, square-ness etc. Men and women were asked why childen play games. Their answer was first: "Because they enjoy them" and secondly, a few individuals commented "They also learn things".

Lomor (1978) and Kol'tsova (1978) from Russia and two Japanese investigators, Inagaki and Hatano (1981, 1968 and 1979) reported similar findings; that peer interaction helps individuals acknowledge and integrate a variety of perspectives on a problem and this eventually produces superior intellectual results. Perret-Clermont (1980)

proposed his hypothesis that peer interaction can induce cognitive conflict that, in turn, results in cognitive re-structuring and growth. This emerges from Piaget's theory concerning the role of social factors in cognitive development, and the Zulu child's degree of peer interaction as compared to adult-child interaction certainly fits the Piagetian viewpoint.

5.4.6 Parental Attitudes

Great tolerance is exhibited by Zulu adults toward their young children. Their mistakes and failures appear to be accepted philosophically and learning takes place in an apparently un-threatening milieu, thus we are not talking about a childrens' culture separate from adults - what Leont'ev and Luria call "the assimilation of general human experience in the teaching process" is happening here, it is grounded in adult-child interactions.

Most likely Vygotsky would have noted that here one was seeing how during the course of interaction between adults and children, young learners are identifying effective means for remembering - means made accessible to them by those with more highly developed memory skills. This, says Vygotsky, has escaped the notice of many Western educators who have viewed childrens' capabilities as being biologically determined rather than socially facilitated.

5.4.7 Classification Skills

When the writer asked the women whether young children are ever taught how to put "like" things together (classify) in their games, for example; they looked bewildered and said "For what purpose?" The writer persisted, explaining that white children often did that as a kind of a game. The Zulu women were at pains to explain that it would be a waste of everyone's time to do something silly like that unless you were say, a sangoma, and you were putting herbs in groups which worked together or had the same effects.

If one notes the relevance of environment and culture in determining what is and is not intelligent behaviour, this would seem to be a pretty good argument. The contextual view emphasises that intelligence always refers to real-world behaviours that are valued by individuals in a particular culture.

5.4.8 The Group

The men and women joined in a discussion about child rearing in general and it appears that considerable emphasis is laid on peergroup learning as well.

This too, is reminiscent of Vygotskyan perspectives where he describes the importance of the group presence, or the contribution that peers can make to each other in the development of minds.

This is rather interesting because the value of Peer Tutoring generally is not perceived by teachers in overcrowded classrooms, whereas it actually occurs as a natural phenomenon in tribal life. The link between the child's real life-world and formal education has, more often than not, failed to be made.

The older Zulu children keep a watchful eye on the younger ones as well as each other's progress and there is a fair degree of competitiveness amongst them.

It must be stressed that this is an extremely superficial investigation and was mainly done for verification purposes. It has been said elsewhere that a full ethnographical study is beyond the scope of this thesis.

6. AN INVESTIGATION INTO THE CLASSIFICATION SKILLS OF ZULU CHILDREN IN THE FIRST GRADE

6.1 SAMPLE DESCRIPTION

Commonly used tests of intelligence reveal the product of thinking, not the processes responsible for the product. Werner (1937) made this point some time ago and while it is not restricted to cross-cultural cognitive research, it is particularly pertinent to this study.

In the 1977 "Annual Review of Anthropology" it was stated that there seems to be little awareness that the measures we have used to measure cognitive functions may be full of our cultural biases and therefore highly inappropriate to the task of comparing across cultures. "Psychologists ... would do well to consider actively the hypothesis that their measures may be biased". (ibid)

It was this kind of thinking which led to the development, in this study, of a specifically designed set of test items of both 2-dimensional and 3-dimensional type, based on objects or pictures of objects which were as familiar to the children in the test sample as possible.
This study is not a comparison of classification skills across cultures. Nevertheless the issues arising must be viewed within the context of culture. It is essentially:

a) an investigation into the difficulties faced by Zulu-speaking children from a remote rural environment being propelled into the formal learning environment of a technological, modern society and

b) An attempt to assess the effects of urbanisation on the development of cognitive skills (particularly classification ability) of Zulu speaking children in the First Grade of school.

6.2 THE HYPOTHESES:

i)   That classification skills do exist in Zulu children's
     cognitive repertoire but that their use has been
     situation specific or contextual within the culture.

ii) That through the process of mediation and through
     direct exposure to stimuli, the cognitive process of
     classification may be enhanced and established into a
     new situation or context; in this case the classroom.

iii) That Zulu children who have been exposed to life in
     urban areas have better classification skills in the
     classroom context in their first year of formal
     schooling than their contemporaries in the rural areas.

6.3 SUBJECTS
Rural Sample

This consisted of 5 Zulu children ranging in age from 6 to
approximately 7 years. No precise dates of birth were
available. These children attended a farm school near
Estcourt in Natal, and spoke no English at all. Instruction
in school was in mother-tongue. These children lived in
traditional huts and practised the customs of the Zulu
people, although all had visited the local town 10 km away
occasionally and had therefore encountered western culture.
The sample consisted of 4 girls named Promise, Goodness,
Lucia and Christina and one boy, Ntokoso. Because of the
small community, a truly random sample was not possible,
those children whose ages were within the limits had to be
chosen.

Urban Sample:

This consisted of 5 Zulu children, the same ages as those in
the Rural Sample. Precise dates of birth in this case were

available. They attended the Methodist Church Junior School in Pinetown, Natal, which is a private, fee-paying school where tuition, at the parents' request, is in English only. These children lived in nearby townships in western-style houses. Their command of the English language was not good.

Generally a western life-style had been adopted, and all had a Television set in their homes. The sample consisted of 3 girls named Dawn, Everything and Hazel and 2 boys, Richard and Patrick.

Subjects in both the Rural and the Urban Samples had completed one full year of formalised schooling at the time of testing.

6.4 TEST DESIGN AND MATERIALS

Because of the lack of an existing test of classification skills which might be used with Zulu-speaking Subjects, it was necessary to design and construct one. It was decided to devise 10 Test items which were 2-dimensional in nature and these comprised Section 1.

A further 10 items were 3-dimensional and comprised Section 2. For each test item there had to be the possibility for categorising and re-categorising the objects in a number of different ways, i.e. different criteria for sorting. These were referred to as "shifts". The objects used for the Test item had to be familiar or known to the Subjects. The influence of both shape and colour were considered in the construction of test items. The completed items were discussed with the teachers of both the Rural and Urban Samples to ensure familiarity. See Appendix 1 for details of items.

6.5   TEST PROCEDURE

The writer visited the schools from which the samples were
to be drawn a few days prior to testing, to allow for
familiarisation to take place. An hour was spent with the
children and the test venue was arranged

Each Subject was seen individually and the test administered
in as uniform a manner as possible. The language used by
the writer for testing was the mother-tongue of the
Subjects, viz. Zulu.

Subjects were given the following instruction (in Zulu):"We
are going to play some games today which I think you will
enjoy. We will look at some pictures and other interesting
things and I am going to ask you to sort out those things
which you think are the same in some way and put them in
groups together."

Upon completion of a recognisable classification, the
Subject was then asked:
"That was good, now can you think of another way in which
you could group these things?"

When Subject could complete no further shifts, the following
item was commenced. The Subjects were encouraged by the
suggestion of different strategies if they appeared at a
loss. Item 1 (Section 1) was treated as a Practice Item
with help and structure provided by the tester. Subjects
were encouraged to explain their groupings and to ask
questions throughout the exercise. Short breaks were
allowed if Subject appeared restless.

On the day following testing, the Subjects experienced 1½
hours of intensive intervention in the form of games (since
games are an integral part of the child's life) and
activities based on classification skills. The tester

initially enacted the procedures with the children,
gradually leaving them to proceed through the tasks on their
own. Peer collaboration and peer discussion were actively
encouraged and observed.
(See Appendix 1 for details of Intervention Training
exercises).

The day after the intervention programme, Subjects were re-
tested on Section 1 only of the Classification Test. These
results will be discussed below.

6.6 DATA TABLES

RESULTS (For Breakdown of Individual Scores, See Appendix 2)

TABLE 1a: Pre-Mediation and Post-Mediation Scores (Rural Sample)			
	RURAL SAMPLE: 2-D ITEMS (Total MNS = 61)		RURAL SAMPLE: 3-D ITEMS (Total MNS = 37)
Promise	17/27	+ 10	15/-
Goodness	20/26	+ 6	15/-
Lucia	14/26	+ 12	13/-
Ntokoso	7/15	+ 8	14/-
Christina	11/26	+ 14	11/-
Pre-Mediation Total = 69			Total: 68
Post-Mediation Total = 120			Total MNS = 37
Average Increase = 10			

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┌─────────────────────────────────────────────────────────────────┐
│ TABLE 1b:  Pre-Mediation and Post-Mediation Scores (Urban        │
│            Sample)                                                │
│      URBAN SAMPLE: 2-D ITEMS          URBAN SAMPLE: 3-D ITEMS     │
│         (Total MNS = 61)                 (Total MNS = 37)         │
│                                                                   │
│ Richard         15/20  +  5                     16/-             │
│                                                                   │
│ Dawn            14/23  +  9                     21/-             │
│                                                                   │
│ Everything      14/20  +  6                     12/-             │
│                                                                   │
│ Patrick         13/18  +  5                     17/-             │
│                                                                   │
│ Hazel           20/29  +  9                     22/-             │
│                                                                   │
│          Post-Mediation Total = 76          Total:   88          │
│                                                                   │
│          Pre-Mediation Total  = 110                              │
│                                                                   │
│          Average Increase     = 68                               │
│                                                                   │
│ KEY:  Above */ = Before mediation (Total Score of Shifts)        │
│                                                                   │
│        Below /* = After mediation (Total Score of Shifts)        │
│                                                                   │
│        MNS = Minimum possible number of Shifts                   │
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│ TABLE 2a:  % IMPROVEMENT IN NO. OF SHIFTS AFTER MEDIATION        │
│            FOR 2-DIMENSIONAL ITEMS                                │
│                                                                   │
│ RURAL SAMPLE                                                      │
│                                                                   │
│ Promise:  From 28% of possible shifts - 44%  =  16%             │
│                                                                   │
│ Goodness:   "  33%   "      "        "   - 43%  =  10%           │
│                                                                   │
│ Lucia:      "  23%   "      "        "   - 43%  =  20%           │
│                                                                   │
│ Ntokoso:    "  11%   "      "        "   - 25%  =  14%           │
│                                                                   │
│ Christina:  "  18%   "      "        "   - 43%  =  25%           │
│                                                                   │
│ Pre-Mediation Scores (Total: 69 out of 305) = 23% of             │
│ possible shifts                                                   │
│                                                                   │
│ Post-mediation Scores (Total: 120 out of 305) = 39% of           │
│ possible shifts                                                   │
│                                                                   │
│ Improvement in Performance = 16%                                 │
└─────────────────────────────────────────────────────────────────┘
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TABLE 2b:

URBAN SAMPLE

Richard: From 25% of possible shifts - 33% of possible
           shifts: increase of 8%

Dawn: From 23% of possible shifts - 38% of possible
           shifts: increase of 19%

Everything: From 23% of possible shifts - 33% of possible
             shifts: increase of 10%

Patrick: From 21% of possible shifts - 30% of possible
           shifts: increase of 11%

Hazel: From 33% of possible shifts - 48% of possible
           shifts: increase of 15%

Pre-mediation Scores: (Total: 76 out of 305) = 25% of
possible shifts

Post-mediation Scores: (Total: 110 out of 305) = 36%

Improvement in Performance = 11%

TABLE 3a:

The influence of colour, shape and object on classifications

2-Dimensional Pre-Training Scores

	No. of Shifts done on basis of COLOUR of card.	No. of Shifts done on basis of SHAPE of card.	No. of Shifts done on basis of OBJECTS on card.
Rural Sample	18	20	31
Urban Sample	20	21	35

TABLE 3b:

3-Dimensional Pre-Training Scores

	No. of Shifts on basis of COLOUR	No. of Shifts on basis of SHAPE	No. of Shifts on basis of SIZE	OTHER
Rural Sample	25	26	3	14
Urban Sample	32	27	4	25

TABLE 4

Total number of classifications observed

	Min.No. of Shifts possible		Total MNS	No. of Shifts achieved		Total
	2-D TEST	3-D TEST		2-D TEST	3-D TEST	
Rural Sample	305	185	490	69	68	137
Urban Sample	305	185	490	76	88	164

Rural Sample: Total No. of Shifts performed (2-D Test) and (3-D Test) = 137

OR 27% of Total MNS.

Urban Sample: Total No. of Shifts performed (2-D Test) and (3-D Test) = 164

OR 33% of Total MNS.

6.7 ANALYSIS OF DATA

This study was primarily observational in nature, therefore what the children actually said and the reasons given for various groupings in the test were just as significant as the scores obtained.

6.7.1 Differences of scores between the Rural Sample and the Urban Sample

In the 3-D Test: The Rural Sample scored a combined total of 68 (See Table 1a).

The Urban Sample scored a combined total of 88 (See Table 1b).

Difference = 20 points

This may be said to indicate that the urban children were considerably more skilled at classification of 3-dimensional objects than the rural sample, the difference between the two samples being even greater for 3-dimensional than 2-

dimensional abilities.

In the 2-D Test: The Rural Sample scored a pre-mediation
combined total of 69 (See Table 1a) while the Urban Sample
scored a pre-mediation combined total of 76 (See Table 1b).
Thus the rural children could be said to have shown less
skill at the 2 dimensional classification tests than the
urban children (Difference of 7 points).

Regarding the Post-Mediation Scores (Section 1 only) the
following were obtained:

Rural Sample = combined total of: 120 (See Table 1a)
Urban Sample = combined total of: 110 (See Table 1b)

This would appear to indicate a more dramatic improvement in
the rural sample's performance in classifying 2-dimensional
objects. This suggests that the intervention programme had
a greater impact on the rural children than the urban
children. Because the samples were so small and not
statistically significant, this observation has to be made
with reservation.

6.7.2 Individual Scores

On an individual basis (See Tables 2a and 2b) it was noted
that the greatest pre-intervention/post intervention
difference in score was obtained by Christina (Rural Sample)
who improved by 15 points, i.e. she managed a total of 15
more shifts after mediation than before. She also showed
much greater verbalisation after mediation, and it was
obvious that she was a highly intelligent child.
The Subjects who showed least pre-intervention/post-
intervention difference in score were Richard and Patrick
(Urban Sample) who improved by 5 points, and here it was the
tester's subjective observation that neither child appeared
as bright as the others in the Urban Sample.

Thus, a Subject's General Intelligence would appear to be an important factor in his classifying ability.

6.7.3 Verbalisation

A most significant observation of both Rural Sample and Urban Sample Subjects was the total lack of verbalisation or self-instruction which took place during the tests. The children worked in complete silence and despite frequent exhortations on behalf of the tester, to explain why a certain categorisation was being carried out, they remained reluctant to say anything. It is accepted that this could have been due to:

a) Unfamiliarity with the tester.

b) Unfamiliarity with the test situation and tasks.

c) A cultural difficulty (Tester a European)

d) Test anxiety.

The following points counter the above:

a) The Urban Sample had been taught by a European teacher for a year and

b) They were familiar with western-style children's games and activities.

c) They had been taught in small groups and not the large, mixed-age groups which the Rural Sample subjects had experienced.

6.7.4 The Influence of Colour, Shape and Object on Classifications

It is interesting to note, in the light of other research done with non-European Subjects where colour choice has played a dominant role, that in this study, in the 2-dimensional test, the concept of shape seems to have had a strong influence (See Table 3a). This occurred in both Rural and Urban Samples. Also, there is very little difference in scores between the two Samples, except that it

would appear that Urban Subjects did more classifying on the basis of the pictures on the cards than did the Rural Subjects. It must be noted that there were more shifts possible on the basis of the pictures than for card colour or card shape, hence the higher scores for this category.

With respect to the 3-Dimensional Test (Table 3b) little difference was noted between number of shifts according to Shape between the Rural Sample and the Urban Sample. There was a greater difference as far as Colour as the basis for classifying was concerned with colour seeming to play a more significant role for the urban children. Again it should be noted that there were fewer MNS for categorising on the criterion of size than for colour and shape. The Urban Sample subjects showed much better organisational skills during 3-Dimensional tasks than the Rural Sample whose behaviour was more haphazard and disorganised. Generally, neither the Rural Sample nor The Urban Sample subjects created broad categories, they tended to have many smaller ones.

6.7.5 <u>Explanations given by subjects for their
classifications</u>

Following are observations from the testing which are of
interest in view of the consideration of the hypotheses for
this study.

<u>Rural Sample</u>

a) A number of Subjects started to classify according to a
particular criterion only to forget halfway through the
task and to continue on another basis altogether.

b) Subjects correctly classified (eg. according to card
shape) but found it difficult to explain the reason for
such a grouping.

c) It was found that for a number of items the actual
function of the pictured objects was used as the basis
for grouping e.g. fruit and vegetables were grouped
according to whether they were eaten raw or had to be
cooked. Trucks and vegetables were grouped together
"because the truck carries the vegetables". (Item 2).

d) Shades of colours were perceived as being different, eg.
paler yellow beads put in a group on their own, separate
from slightly darker yellow ones.

e) For Item 5 (Twigs) not one of the Subjects used
Seriation as a criterion. Children tended to give the
reason that pairs of twigs "came from the same tree",
rather than noting length, thickness etc. The same
applied to Item 3 (Leaves), they were not seen according
to size or shape but rather as having come off the same
tree.

f) In Item 1 (Flowers, insects, birds, vegetables) a few
children put the birds and vegetables together "because
the birds eat these". It was apparently not of such
practical value to note that birds also eat insects!

g) For Item 4 (Black family/white family members) it was
interesting to note that most of the Subjects first
classified the pictures according to Mothers/Fathers/
Sons/Daughters, without regard for racial division, and

only on the 2nd or 3rd shift did the racial
classification occur, if it occurred at all.

Urban Sample

a) The concentration span was better with this group and
there were not as many mixed classifications. Possibly
better nutrition could be a reason for this.

b) Broad categories were not easily achieved, again
Subjects tended to make small, sub-class groupings.

c) Urban Sample subjects performed the so-called "Kpelle
Test" (Item 9 3-Dimensional Test) more successfully and
in more organised a fashion than Rural Sample children.

d) Practical viewpoints were still observable in the urban
Subjects eg. in Item 1, the beetle is put with the
flowers "because it eats them". In item 3, the cat is
grouped with the mouse "because the cat eats the mouse".

Viewed in this light, many of the picture cues may have
been fairly meaningless for the children and could have
been a reason for the generally poor level of
classifications observed in the study. (See Table 4).

6.8   EXAMINATION OF THE HYPOTHESES

It is now necessary to examine the hypotheses in the light
of the data.

6.8.1 The first hypothesis stated that classification
skills do exist in Zulu childrens' cognitive
repertoire, but that their use has been contextual
within their particular culture. The fieldwork in
this study attempted to test this by observing
closely what classifications took place and the
reasons given by the children for their groupings.
It has been noted in the Analysis of Results that:
i) Relatively few classification shifts took place
overall. (Rural Sample 137 and Urban Sample 164

out of a minimum possible number of 490). This
suggests that within the formal classroom
situation, the Zulu children were not employing
the cognitive process of classification as it was
being tested.

ii)   However, grouping of a sort <u>was</u> taking place and
the nature of these categorizations did suggest
that the hypothesis of situation specific
activity was a strong one. In other words, in a
context-free situation, the children were not
good at classifying, but if a practical or
functional purpose could be found for putting
things together, it was done more easily. In
some of the games described earlier, for example,
quite elaborate groupings are evident (Upuca or
Nhodo). In addition, an analysis of the <u>reasons</u>
given by the children for their categorisations
suggest that they are perfectly capable of
classifying, but not as an apparently meaningless
task. Thus it could be said that the first
hypothesis was supported by the data.

6.8.2   The second hypothesis states that through the
process of mediated learning experience and through
direct exposure to stimuli, the cognitive process of
classification may be enhanced and established into
a new situation, namely, the classroom.
Although the numbers involved in the study were
extremely small, figures indicate that the
intervention programme resulted in a greater number
of classification shifts taking place in the post-
intervention testing session. (The Rural Sample
showed an increase of 51 shifts while the Urban
Sample had an increase of 54 shifts).
It would also appear that the traditional games
played by Zulu children had not significantly
enhanced their ability to perform the classification
tasks required in the test, because it was only

after playing the western-style games that their performance improved.

This is in spite of the fact that ability to group things is developed during Zulu game-playing. It is just that it had real meaning in that context. It was noted by the tester that the children's test behaviour was more confident in the subsequent sessions and more verbalisation took place.

The second hypothesis could therefore also be said to be supported by the data.

6.8.3 The third hypothesis proposed that Zulu children who have been exposed to life in urban areas have better classification skills in the classroom context in their first year of formal schooling.

a) The pre-intervention scores suggest that this hypothesis is true, with the Urban Sample Subjects obtaining a higher overall score (76 Shifts) than the Rural Sample Subjects (with 69 Shifts).

b) The hypothesis is strengthened by the fact that the Rural Sample Subjects improved by a greater measure following mediation and training within a classroom situation (The Rural Sample's post-training performance improved by 16% compared to the Urban Sample's 11% improvement).

Thus the third hypothesis too, was found to be supported by the data.

7. CONCLUSIONS

7.1 LIMITATIONS OF THE STUDY

The present study was limited in scope and the whole area of classifications ability among Black children requires more rigorous investigation. Essentially, however, it served as a preliminary investigation, a pilot study of what could be undertaken on a much larger scale.

A more comprehensive study should involve a larger sample, since there are a number of problems inherent to small scale research.

Despite the fairly significant findings in the study, larger groups would have enhanced the strengths of the conclusions drawn, because the data here could not be subjected to statistical analysis, for the above reason.

A further limitation was that although the tester spoke Zulu fluently enough, there was undoubtedly unease, initially at least, among the subjects at the presence of a White woman, perceived inescapably as an "authority figure", who was going to test them. This applied particularly to the rural sample. No amount of pre-testing familiarisation could substantially diminish this important variable.

The test itself, designed specifically for this study, tended to be clumsy, especially the 3-dimensional section where clothes, shoes and tools, for example, had to be transported around. It was difficult to find suitable pictures for the 2-dimensional section and it is felt some of these may have been misleading for the Subjects.

Venues to carry out both testing and mediation sessions were awkward and there were some distractions which were difficult to minimise.

A further flaw in the testing was that it was rather lengthy and many of the Subjects appeared unaccustomed to this type of cognitive demand. It might be that the tasks were too time-consuming. Furthermore, the Subjects in the Rural Sample were less familiar with the plastic shapes used in the 3-dimensional tests than the Urban Subjects.

7.2 POSSIBILITIES FOR FURTHER RESEARCH AND EXTENSION

A number of possibilities for further research arise from the present study. Most of these have already suggested themselves from the above critique.

Certainly larger samples would yield more statistically significant results, but it is a strong conviction on the part of this writer than an invaluable dimension of research would be lost if statistics were simply the main focus. The consideration of the Subjects' comments during the testing is felt to be of major interest and importance in the investigation of cognitive development in children. Thus any further study should not lose the qualitative nature, becoming instead merely quantitative.

It should be interesting furthermore, to see a similar study conducted by a person who is himself or herself a Zulu.

A further area of interest might be the use of control groups within either a rural or an urban population. There could be a great deal of untapped information here, in which teacher-involved mediation might play a part, on a longer-term basis. In this way it might be ascertained to what extent the mediation has been effective and/or generalised.

The development of a commercially produced Classification skills Training Set designed especially for the Black child in Rural areas is a possibility, since there do not appear to be such aids available at present. This would probably

require more widespread application to ascertain the
suitability and validity of the existing test items as
designed by the writer, and the possible inclusion of
different tasks.

Generally, it appears that there are a number of
possibilities open for further research in this field as
well as the study itself being extended. Jean Lave (1988)
claims that granting intrinsic value to the study of "what
people really do" has made it appear that there is a
lamentable sacrifice of methodological rigor (assumed to be
impossible to achieve outside the experimental context).
She calls for the rejection of this "caricatured view" of
the study of socially situated cognition, and this approach
suggests, finally, that the classification skills of Zulu
children might be studied most profitably of all, in their
own culturally and socially constituted activities and
settings of everyday life.

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APPENDIX 1

INTERVENTION TRAINING EXERCISES (1 MORNING)

1. Large piece of cardboard with squares, triangles and circles cut out. Let child trace openings with forefinger. Place shapes through holes forwards and backwards, name shapes aloud.

2. Ask children to describe the shapes called out, with their hands, in the air.

3. Flash-cards in different coloured cardboard squares, triangles and circles. Ask children to draw what they've just seen on their own piece of paper.

4. Children to make shapes on ground with small stones.

5. Use of Invicta "Attribute Blocks" (various shapes including squares, triangles and circles in varying sizes, colours and thicknesses).

6. Game where child is given one of the above blocks in hands held behind back. Without looking, must describe shape and thickness. Sweet given if answer is correct.

7. Asked to group blocks according to various criteria eg. Find all triangles then group them according to thickness. When done, ask for different criteria according to colour, then size, etc.

8. Put all cardboard shapes (exactly like the ones in Section A of test) together with Attribute Blocks of same size, shape, colour etc.

9. Ludo Games: (Pictures or shapes on a large card to be covered with small individual cards which match exactly). Animal Ludo, Geometric shapes Ludo and Fruit and Flowers etc.

10. Real fruits and vegetables to be grouped and re-grouped.
    First explain and do some examples.

11. Pictures of clothing - ask child for different ways of
    putting "like things" together.

12. Toy cars/trucks different colours, different size,
    different uses etc.

13. Various types of puzzle of the type: pick out the
    object which does not belong with a set or pick out all
    the shapes/objects which are the same. To be done with
    Tester and child on a one to one basis.

14. Pieces of coloured Lego blocks, long, short, large,
    small and varying colours. Show children and then ask
    for different groupings, helping all the time.

15. Skittles (small, various colours and wearing different
    hats). Children to group according to colour, then
    type of hat etc.

16. Books designed for Black children, on counting, and
    grouping. Children to sit quietly and look through
    them.

DETAILS OF ITEMS IN 3-DIMENSIONAL TEST

Item 1: Insects, flowers, vegetables, bird. (coloured cards, all shapes).

Item 2: Vehicles, vegetables (coloured cards, all shapes).

Item 3: Animals, wild and domestic (square white cards).

Item 4: Man, woman, children, infants (Black & white) (square white cards)

Item 5: Birds, animals, insects (Black & white) shaped cards.

Item 6: Bulls, cows, (photographs (colour))   and shapes, white card.

Item 7: Roosters, hens, chickens (white card, all shapes) (white pictures).

Item 8: Vegetables, fruit (coloured squares, circles and triangles, colour photos)

Item 9: Male workers/Female (Black & white drawings, coloured card shapes)

DETAILS OF ITEMS IN 3-DIMENSIONAL TEST

Item 1: Buttons, paperclips, large beads (5 of each colour and size).

Item 2: Simple sweets in various clear colours and shapes. (3 of each shape and colour).

Item 3: Leaves of different shapes, sizes and colours (2 of each)

Item 4: Beads (various shapes, colours and sizes approx. 5 of each).

Item 5: Twigs (Matching pairs of long, medium and short; thick and thin)

Item 6: Plastic toy farm animals (Selected for type and colour)

Item 7: Vegetables and fruits (Selected to provide for various groupings)

Item 8: Clothing (Chosen for colour, material, part of body to be clothed etc.)

Item 9: Clusterable items as in the Kpelle test (Food/
          utensils/clothing/tools)
Item 10: Invicta "Attributable Blocks" (Set contains
          triangles, squares, circles etc. in plastic made in
          various sizes, colours and thicknesses)

RESULTS - Details of Individual Scores

RURAL SAMPLE

2-DIMENSIONAL ITEMS

Item Nos.	1	2	3	4	5	6	7	8	9	10	TOTAL
Promise	3/3	0/3	1/1	1/2	2/3	1/3	2/2	2/3	2/3	3/4	17/27
Goodness	3/3	3/3	1/1	2/3	2/3	1/2	2/2	1/3	2/3	3/3	20/26
Lucia	3/3	1/3	1/2	2/2	2/3	0/3	1/2	1/3	1/2	2/3	14/26
Ntokoso	1/1	1/2	0/0	1/2	1/2	1/1	0/2	0/3	1/1	1/1	7/15
Christina	2/3	1/4	0/1	1/2	1/3	0/2	2/2	1/3	1/3	2/3	11/26

Min. possible No.
of Shifts (MNS)

	6	7	6	6	5	4	7	8	6	6	61

Key: Pre-mediation score/Post mediation score   Total Pre-Training   69
    Total Post-Training 120

3 DIMENSIONAL ITEMS

Item Nos.	1	2	3	4	5	6	7	8	9	10	TOTAL
Promise	1/-	2/-	1/-	2/-	1/-	1/-	1/-	2/-	3/-	1/-	15/-
Goodness	2/-	2/-	1/-	2/-	1/-	1/-	1/-	1/-	2/-	2/-	15/-
Lucia	2/-	2/-	1/-	1/-	1/-	1/-	0/-	0/-	4/-	1/-	13/-
Ntokoso	2/-	1/-	1/-	1/-	1/-	1/-	2/-	1/-	3/-	1/-	14/-
Christina	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-	2/-	11/-

    TOTAL 68

Min. possible No.
of shifts (MNS)

	2	3	5	4	4	5	4	4	4	3	37

URBAN SAMPLE:

2-DIMENSIONAL ITEMS

Item Nos	1	2	3	4	5	6	7	8	9	10	TOTAL
Richard	2/2	1/2	1/1	2/2	2/2	2/3	1/2	2/4	1/1	1/.1	15/20
Dawn	2/2	1/2	1/1	2/3	0/2	0/2	2/2	2/3	2/3	2/3	14/23
Everything	2/2	1/2	0/1	2/1	2/2	1/2	1/1	2/4	2/2	1/3	14/20
Patrick	0/2	1/1	0/1	0/1	2/2	1/1	2/3	2/2	2/2	3/3	13/18
Hazel	2/3	2/3	0/2	3/3	3/3	2/2	2/3	3/3	2/5	1/2	20/29

Min. possible No.
of shifts (MNS)

	1	2	3	4	5	6	7	8	9	10	TOTAL
	6	7	6	6	5	4	7	8	6	6	61

Key: Pre-Mediation Score/Post Mediation score   Total Pre-training 76
                                                          Total Post-training 110

3-DIMENSIONAL ITEMS

Item Nos.	1	2	3	4	5	6	7	8	9	10	TOTAL
Richard	2/-	1/-	1/-	2/-	1/-	1/-	0/-	1/-	4/-	3/-	16/-
Dawn	2/-	2/-	1/-	3/-	1/-	2/-	1/-	2/-	4/-	3/-	21/-
Everything	1/-	2/-	1/-	1/-	0/-	2/-	0/-	1/-	3/-	1/-	12/-
Patrick	2/-	2/-	2/-	2/-	1/-	2/-	0/-	1/-	4/-	1/-	17/-
Hazel	2/-	2/-	1/-	2/-	2/-	2/-	2/-	2/-	4/-	3/-	22/-
										TOTAL	88

Minimum possible
Number of shifts

	1	2	3	4	5	6	7	8	9	10	TOTAL
	2	3	5	4	4	5	4	4	4	3	37

ESULTS - Details of Individual Scores

URAL SAMPLE

2-DIMENSIONAL ITEMS

tem Nos.	1	2	3	4	5	6	7	8	9	10	TOTAL
romise	3/3	0/3	1/1	1/2	2/3	1/3	2/2	2/3	2/3	3/4	17/27
oodness	3/3	3/3	1/1	2/3	2/3	1/2	2/2	1/3	2/3	3/3	20/26
ucia	3/3	1/3	1/2	2/2	2/3	0/3	1/2	1/3	1/2	2/3	14/26
tokoso	1/1	1/2	0/0	1/2	1/2	1/1	0/2	0/3	1/1	1/1	7/15
hristina	2/3	1/4	0/1	1/2	1/3	0/2	2/2	1/3	1/3	2/3	11/26

in. possible No.
f Shifts (MNS)

	6	7	6	6	5	4	7	8	6	6	61

ey: Pre-mediation score/Post mediation score   Total Pre-Training 69
Total Post-Training 120

3 DIMENSIONAL ITEMS

tem Nos.	1	2	3	4	5	6	7	8	9	10	TOTAL
romise	1/-	2/-	1/-	2/-	1/-	1/-	1/-	2/-	3/-	1/-	15/-
oodness	2/-	2/-	1/-	2/-	1/-	1/-	1/-	1/-	2/-	2/-	15/-
cia	2/-	2/-	1/-	1/-	1/-	1/-	0/-	0/-	4/-	1/-	13/-
okoso	2/-	1/-	1/-	1/-	1/-	1/-	2/-	1/-	3/-	1/-	14/-
ristina	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-	1/-	2/-	11/-

TOTAL 68

n. possible No.
shifts (MNS)

	2	3	5	4	4	5	4	4	4	3	37

2-DIMENSIONAL ITEMS

em Nos	1	2	3	4	5	6	7	8	9	10	TOTAL
chard	2/2	1/2	1/1	2/2	2/2	2/3	1/2	2/4	1/1	1/1	15/20
wn	2/2	1/2	1/1	2/3	0/2	0/2	2/2	2/3	2/3	2/3	14/23
erything	2/2	1/2	0/1	2/1	2/2	1/2	1/1	2/4	2/2	1/3	14/20
trick	0/2	1/1	0/1	0/1	2/2	1/1	2/3	2/2	2/2	3/3	13/18
zel	2/3	2/3	0/2	3/3	3/3	2/2	2/3	3/3	2/5	1/2	20/29

n. possible No.
shifts (MNS)

	1	2	3	4	5	6	7	8	9	10	TOTAL
	6	7	6	6	5	4	7	8	6	6	61

y: Pre-Mediation Score/Post Mediation score   Total Pre-training   76
Total Post-training 110

3-DIMENSIONAL ITEMS

em Nos.	1	2	3	4	5	6	7	8	9	10	TOTAL
chard	2/-	1/-	1/-	2/-	1/-	1/-	0/-	1/-	4/-	3/-	16/-
wn	2/-	2/-	1/-	3/-	1/-	2/-	1/-	2/-	4/-	3/-	21/-
erything	1/-	2/-	1/-	1/-	0/-	2/-	0/-	1/-	3/-	1/-	12/-
trick	2/-	2/-	2/-	2/-	1/-	2/-	0/-	1/-	4/-	1/-	17/-
zel	2/-	2/-	1/-	2/-	2/-	2/-	2/-	2/-	4/-	3/-	22/-

TOTAL   88

nimum possible
umber of shifts

	1	2	3	4	5	6	7	8	9	10	TOTAL
	2	3	5	4	4	5	4	4	4	3	37