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CURIOSITY IN AFRICANS AND EUROPEANS

by

Bernardina Foden

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This study was carried out within the context of a larger project, under the leadership of Dr. Y.H. Poortinga, involving the measurement of curiosity and indices of arousal and their interrelationships in a group of African and European students. This thesis is, however, my own work and has not been submitted to any other University.

B. I. M. FODEN.

"It is evident that man's intellect, when coupled with curiosity and an urge for action will engender the process of cultural change which we call civilization".

(Biesheuvel, 1959, p.8.)

ABSTRACT

In this study an attempt was made to measure curiosity by means of tests of its prime determinants, complexity, novelty, incongruity, conflict and uncertainty (cf. Berlyne, 1960) in a group of 50 African and 47 European university students and to determine whether the curiosity construct operates in a similar manner in both samples. A curiosity questionnaire and a self-rating scale, containing items relating to curiosity, were constructed in order to test the face validity of these determinants of curiosity and some intelligence measures were also included in the test battery to determine whether the curiosity measures were distinct from intelligence.

While results of the tests showed that, on the whole, the determinants of curiosity operate in the manner suggested by Berlyne, no evidence for a unifying construct underlying these determinants was found. Evidence that the tests operated in a similar manner in the two cultural samples is discussed in relation to Poortinga's (1971) requirements for cross-cultural comparability.

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CHAPTER I

THE CONCEPT OF CURIOSITY

1. Historical Background

Since the early 1950's, there has been a resurgence of interest in curiosity and exploratory behaviour. Psychologists again began to ask themselves questions such as: "Why does an animal approach and explore a new object encountered in a familiar environment?", "Why should a rat which has taken one route through a maze tend to take a different one when immediately returned to the starting box?", How do we account for the playful behaviour of higher animals, children and even adults?", "Why should healthy young men dislike resting all day in a dark and quiet room?" (Fiske & Maddi, 1961).

These questions are hard to reconcile with the view that behaviour is essentially directed towards minimizing stimulation and excitation. Many investigators have come to realize that a good portion of behaviour is characterized not so much by activity which serves to satisfy the primary needs of the organism (hunger thirst and sex, etc.) but rather by the tendency to seek out new forms of stimulation. (Hebb,1949; Leuba,1955)

Several theories of curiosity and exploratory behaviour were formulated in the early 1950's. These were based almost entirely on data obtained from the laboratory rat. A large number of studies (Barnes & Barron, 1961;

Berlyne, 1950, 1955; Berlyne & Slater, 1957; Dember, 1956; Fowler, 1958; Kivy, Earl & Walker, 1956; Levil & Forgays, 1959; Montgomery, 1953,1954; Montgomery & Segall, 1955; Myers & Miller, 1954) was conducted, showing that without apparent motive other than the exploratory drive, rats would respond quite readily to a variety of stimulus objects of one form or another and that furthermore, the "exploratory drive" or curiosity could provide a basis for simple discrimination learning. Around the same period, the work of Harlow (1953,1956) and Butler (1953,1957) showed that mere auditory and visual incentives were adequate to maintain a high level of exploration in the monkey and that discrimination problems could also be learned in the course of such activities.

However, it was not until the publication of Berlyne's (1960) book, "Conflict, Arousal and Curiosity", that interest was focused on the exploratory activities of human beings. Since then a large number of experimental and theoretical articles on the subject have been published, many of which will be dealt with in the course of this chapter.

2. The Definition and Theory of Curiosity

Although there has been a steady increase in the number of studies carried out on curiosity and exploratory behaviour, the terms have been used with reference to widely varied phenomena and a satisfactory definition of

the 2 constructs remains to be formulated. One reason why the task of defining curiosity seems to be so difficult is that psychologists have attempted to integrate it into the existing drive-reduction framework. Traditionally psychology, and especially behaviouristic theories, have concentrated on the problem of "Response Selection", asking questions of the form: "What response will this animal make to this stimulus?" (Berlyne,1960,p.6) In the laboratory situation where the animal or person is confronted with one or a limited number of stimuli, this question is usually adequate; however, outside the laboratory in the everyday situation, the organism is usually exposed to a large variety of stimuli at the same time. According to Berlyne, in this situation a more relevant question is often "To what stimulus will this animal or person respond?". It is in this question that psychologists investigating curiosity and exploratory behaviour are interested.

The big problem in defining curiosity and exploratory behaviour is that there appears to be no goal object to and for which the animal responds. Berlyne (1963), Fiske & Maddi (1961) and Fowler (1965) have, for example, defined curiosity and exploratory behaviour as behaviours that have the sole function of altering the stimuli that impinge on the organism. However, the effect of changing the organism's stimulus field appears to be characteristic of all behaviours (food-seeking, escape from pain, etc.). Thus with this definition we are faced with the fact that virtually all responses possess an exploratory function to

some extent, and of course, this may be the case (Fowler, 1965). One could say, as Berlyne (1963) does, that the essential difference between exploratory and other responses is that non-exploratory responses have biologically important functions on tissues other than the sense organs and the nervous system. Livson (1967) makes a similar distinction. Curiosity and exploratory behaviours can then be considered as a wide assortment of behaviours that have nothing in common other than that one cannot recognize a specific biological function for them.

The above attempts at definition, though perhaps rather vague and negativistic, have nevertheless been the starting point of most of the studies that have been carried out to late.

Still other definitions of curiosity derive from the concept of optimal stimulation or arousal (cf.Berlyne,1960; Fiske & Maddi, 1961; Hebb, 1955; Leuba,1955) which has been put forward by these authors as a substitute for the unsatisfactory concept of drive reduction which assumes that the goal of all primary motivation is to reduce stimulation to a minimum. Within the framework of these theories of optimal stimulation, curiosity is seen as the behavioural concomitant of a physiological need for stimulation. It seems that the central nervous system of higher animals is designed to cope with environments that produce a certain rate of influx of stimulation and is actually dependent on this stimulation for its wellbeing. It will not perform at its best in an environment that overstresses or overloads it, but there

is also evidence that prolonged subjection to a very monotonous or unstimulating environment is detrimental to a variety of psychological functions (cf. Zubek, 1964; Zubek & Welch, 1963; Zubek et al, 1970) It is therefore plausible to suppose that organisms seek out stimulation that taxes the nervous system to the right extent. The relationship between arousal and curiosity can thus be depicted as an inverted U-shaped curve. Berlyne (1963) thus defines curiosity as a state of heightened arousal, an aversive condition brought about by incomplete perception of a sector of the stimulus field which leaves the subject in some uncertainty regarding its characteristics.

There is considerable support for theories connecting curiosity and arousal. A great deal of experimental work (cf. Sokolov, 1963) has shown that some forms of exploratory behaviour are accompanied by pervasive psychophysiological changes, including several recognized indices of arousal such as the EEG and GSR. Secondly, stimuli which have been shown to be capable of increasing curiosity (e.g. novel or surprising stimuli) are also capable of increasing arousal. A large number of studies (Baker & Franken, 1967; Berlyne 1960, p.190; Berlyne et al, 1963; Berlyne & Lewis, 1963; Berlyne & Lawrence 1964; Berlyne & Mc Donnel, 1965; Berlyne et al, 1968) has been carried out showing that curiosity-provoking stimuli can profoundly affect the GSR and the duration of alpha desynchronization in the EEG.

However, at this stage it is perhaps wiser not to equate curiosity with a state of heightened arousal since the

relationship between curiosity and the state of arousal is not isomorphic. For example the level of arousal may be affected by stimuli that do not provoke curiosity; it has also been shown that different measures of physiological arousal may reflect different dimensions of behavioural arousal. Lacey (1967), for example, differentiates between electrocortical, behavioural and autonomic arousal.

For the purpose of this dissertation, it has therefore been decided to view the level of arousal as a physiological concomitant of curiosity, rather than as the determinant and to define curiosity as a motive to acquire or transform incoming stimulation under circumstances that offer no immediate value for such activity in terms of classic biogenic needs or acquired drives.

3. The Classification of Curiosity and Exploratory Behaviour

A number of systems of classification are at present in use. Curiosity has been divided up according to the form it takes (Berlyne, 1960,p79, 1963; Fiske & Maddi,1961). The first type of exploration is the orienting or receptor-adjusting response (Sokolov, 1963) which involves slight muscular and postural adjustments such as head turning or simple ocular movements. The second type of exploration under this classification is the investigatory response which involves greater adjustments in the physical relationships between the individual and his environment, including locomotion and simple manipulation such as picking something up. Play is the third type of exploratory behaviour and it involves a longer period of interest than

that which characterizes the investigatory and orienting responses. This classification does, however, not seem to be very profitable, since it is impossible to say with any certainty what essential distinctions correspond to these superficial boundary lines.

A more fruitful classification is that of Berlyne (1963) into intrinsic and extrinsic types of exploration. Food-seeking and other classes of behaviour for which there are clearly discernable and unique consequents may be viewed as extrinsic exploratory behaviour, while intrinsic exploratory behaviour refers to those types of behaviour that are carried out for their own sake.

Then there is the distinction between specific and diverse exploration. Specific exploration has the function of providing stimulation from a definite source. It is the kind of behaviour we perform when we are looking at or for something in particular. Diverse exploration, on the other hand, has the function of introducing stimulation from any source that is interesting or entertaining. Whenever the external environment is inordinately dull or monotonous, diverse exploration is likely to occur.

A further distinction which is often made is that between perceptual and epistemic curiosity. The distinction is very similar to that made between specific and diverse exploration. Berlyne has defined perceptual curiosity as the state of heightened arousal that can be relieved by specific exploration and in which specific exploratory responses are likely to occur, whereas epistemic curiosity is the state

of heightened arousal that can be relieved by the acquisition of knowledge, by which is meant structures of symbolic responses (Berlyne, 1954).

4. Factors influencing Curiosity

The appearance and strength of the curiosity motive or drive for exploration is dependent on many factors both inside and outside the organism. Physical factors in the individual's own history or in that of his predecessors may affect his arousal potential (cf.Cowley & Griesel, 1963, 1964) and thus indirectly curiosity. There is also no doubt that curiosity is influenced by social and environmental factors such as the stimulation and reinforcement of exploratory behaviour and experience with certain stimulus material. The properties of external stimuli, e.g. brightness, loudness and colour also influence the appearance and strength of curiosity. However, according to Berlyne (1954, 1960, 1963, 1965) who has done extensive research in the field, the paramount determinants of curiosity are a group of stimulus properties commonly referred to by such terms as:"novelty","surprisingness","change","incongruity", "ambiguity","uncertainty","variability","complexity" and "puzzlingness". These properties are collectively referred to by Berlyne as "collative properties".

What these collative properties of stimuli have in common to give them the motivational effects they apparently have is still a debatable question. At present there are 2 main groups of theories on the subject which are closely related

to each other. According to Berlyne, their common effect lies in conflict between incompatible neural and ultimately motor actions. When a subject is confronted with discrepant items of information, responses corresponding to each of them will presumably be instigated but these responses must necessarily compete with one another. For example, a stimulus pattern that is novel must have some resemblance to a number of familiar stimulus patterns, say x,y,z and yet not be quite like them. This means that responses associated with x,y,z will be instigated by stimulus generalization, but since x,y, and z are distinct there must be some degree of incompatibility between them. Furthermore, the fact the novel stimulus is discriminable from x,y, and z will make for the inhibition of these responses and will conflict with their excitation (Berlyne, 1963). The reduction of conflict through exploration is held to be rewarding.

A second broad group of hypotheses attributes the motivational effects of these collative properties to "stimulus change" (Dember & Earl, 1957), "variation in stimulation" (Fiske & Maddi, 1961), "discrepancy between the kind of stimulus the organism receives and the kind it is set to receive" (Hebb, 1949; McClelland,1953; Sokolov,1963), or "inconsistency between available items of information" (Festinger,1957; Heider,1946).

Both the "conflict" hypothesis and the hypotheses of the "stimulus change" type explain the motivational effects of the collative stimulus properties adequately. Closer examination reveals all these explanations to be very similar

(cf. Berlyne, 1965; Fiske & Maddi, 1961). During the course of this dissertation the conflict hypothesis will be roughly adhered to, although it is perhaps preferable to think of conflict as one determinant of curiosity rather than as the determinant underlying all the collative variables.

It should perhaps be mentioned that the collative variables are by no means confined to occasioning and directing exploratory responses. Instead of eliciting exploration, which involves approach, novel, surprising or strange objects, for example, may evoke fear and flight. Whether exploration or flight will occur depends to a large extent on how disturbing the stimulus is, and on the internal state of the organism (e.g. how tense he is, on his personality). Observations of vascillation between curiosity and fear have often been observed in animals and human beings.

A. The Collative Variables as Determinants of Curiosity

The collative stimulus properties mentioned earlier are all to a greater or lesser extent related to each other and can be divided into 4 main categories: complexity, uncertainty, novelty and incongruity. Some of the research relevant to these collative properties and conflict will be dealt with briefly.

(a) Complexity

Stimulus complexity refers to the amount of variety or diversity in a stimulus pattern. Degree of complexity is considered by Berlyne (1960, p.38) to be positively related to the number of distinguishable elements in a stimulus complex and to the extent of dissimilarity between elements.

It varies inversely with the degree to which several elements in a stimulus complex are responded to as a unit. Although stimulus complexity seems to be relatively easy to deal with since it can be described in terms of the physical attributes of a particular stimulus, judging by the number of studies that have been carried out and the number of conflicting results that have been produced, it seems to be an extremely elusive concept.

Most investigations on the affects of complexity on curiosity in human beings have used visual stimuli and tachistoscopic exposure techniques. Experiments are usually one of two types: in the first, subjects are presented simultaneously with two stimuli, differing in complexity level, on a screen and asked which they prefer, or, alternatively, the amount of time spent fixating each stimulus and corresponding eye movements are recorded. These recordings are then taken as a measure of the subject's "curiosity" in each stimulus. In the second type of experiment, the subject is presented with a variety of stimuli exposed on the screen, one at a time, and given some means of controlling the exposure time of each stimulus. The length of looking time at each stimulus is then taken as a measure of his curiosity in that stimulus. Physiological measures such as the EEG and GSR are often recorded simultaneously.

Using more or less the above methods, Berlyne (1957, 1958), Berlyne & Lawrence (1964), Day (1965, 1966, 1967), Greenberger et al. (1967), Leckart (1966), Minton (1963,

1963a) found that subjects spent systematically more time looking at the more complex stimuli and preferred the more complex figures to simpler ones. Other studies, (Baker & Franken, 1967; Berlyne & Lewis, 1963; Berlyne et al. 1963; Berlyne & McDonnel, 1965) equating curiosity with increases in arousal have found an increase in the duration of alpha desynchronization in the EEG and an increase in the amplitudes of the GSR with increased complexity of patterns.

Not all results have been positive, however. Berlyne (1963a), using the first method described above, found that subjects showed a tendency to select more complex or irregular patterns when initial exposures lasted 0,5 to 1,0 seconds and less complex patterns when exposures lasted 3 to 4 seconds. Berlyne explains this by postulating that the 0,5 to 1,0 second exposures were insufficient to identify the pattern and that in such cases motivation would include a large quota of perceptual curiosity; therefore subjects would be more likely to choose the more irregular figure. Longer exposures are more likely to permit absorbtion of adequate information regarding the nature of both patterns and subjects would be influenced more by the kind of motivational state that underlies diverse or aesthetic exploratory behaviour. Heckhausen (1964) feels, however, that the apparent contradictions in this study arise solely from the "premature equating of information theoretic calculus" with an "elementaristic theory of psychological functioning." He points out that behaviour is a function, not of complexity in the information theoretic sense, but of complexity as

perceived. Whereas the more irregular patterns in Berlyne's study were less redundant or more complex in an information theoretic sense, phenomenally they were less complex than some of the less irregular patterns.

Other studies have found a negative relationship between complexity and preference. Eisenmann (1966, 1967) found that his subjects favoured symmetrical shapes and "rejected complexity to a highly significant extent".

Individual differences in complexity have also been observed in a number of studies. Dembr r and Earl (1957) have put forward the notion that individuals have a preferred or optimal level of complexity called the "pacer stimulus". They state that the subject will attend most frequently to the pacer stimulus as compared with stimuli of a greater or lesser complexity level. Vitz (1966) using a paired comparison design found considerable experimental support for this idea. Munsinger & Kessen (1964) found that unsophisticated subjects preferred a lower level of complexity as compared with subjects who had experience with variable or complex stimuli, whether this preference was induced experimentally or was the result of specific professional training.

Other studies have related preference for complexity to age. Munsinger, Kessen & Kessen (1964) and Pialstick & Woodruff (1964) found that younger children preferred a higher level of complexity than older children and older children than adults. Brennan, Ames & Moore (1966) and Munsinger & Weir (1967), however, found complexity to be

an increasing linear function of age in young infants. Thomas (1966) tested 878 subjects from 6 to 19 years of age and found that fixation time was a linear function of complexity in all age groups up to the age of 16; thereafter the function was characteristically non-monotonic with age dependent shifts in the point of peak preference. Hutt and McGrew (1969) and Black et al. (1971) also found that preference for complexity increases with age.

One reason for some of the disagreements in the field is the number of different types of complexity that have been used in these studies: e.g. number of distinguishable elements (Berlyne, 1960), number of independent turns of a figure (Munsinger & Kessen, 1964), number of steps (Vitz, 1966). Other writers point out that complexity need not necessarily be unidimensional. Rump (1968), for example, obtained zero correlations between scores of preference for asymmetry, multiplicity and heterogeneity of elements. He warns, furthermore, that reports should mention the various measures used in the study instead of the term "preference for complexity". Clearly more systematic research is needed to clarify the subject.

(b) Novelty

Berlyne (1960, p.18) defines novelty as the presence in a stimulus of some property never previously experienced by the organism (absolute novelty), or the presence of familiar elements in a combination or pattern which is new to the organism's experience (relative novelty). In addition

a stimulus may be considered novel because it has not been encountered for a period of minutes or hours (short-term novelty) or because it has not been encountered for a period of days, months or years (long-term novelty.) Thus novelty cannot be considered independently of the organism's past experience or total environment.

Since it is impossible in most cases, with the possible exception of infants, to gain firm knowledge of the subject's past experience, the general practise in most experiments on novelty is to familiarize the subject with one set or class of stimuli and then to provide a choice between these stimuli and ones not encountered previously in that situation.

There is fairly general agreement in the literature that novel stimuli are prepotent in eliciting attention, orientation and exploration with only extreme or intense degress of novelty evoking avoidance and fear. Berlyne (1957, 1958, 1968, 1970), Greenberger et al. (1967) and Leckart (1966) found that free looking time and stimulus preference are directly related to stimulus novelty. Fantz (1964), in a study of new-born infants, found a greater fixation time to novel stimuli than to familiar equivalents. Hutt (1967) found that 7-month old infants would grasp and manipulate novel objects (presented by a familiar adult) with alacrity. Attention was found to decrease with repeated presentation of an object. Harris (1965) and Mendel (1965) also found that kindergarten children showed a preference for novel toys as compared with familiar ones.

(c) Incongruity

This collative variable can be regarded as a form of relative novelty. Incongruity exists when a stimulus induces an expectation which turns out to be disappointed by the accompanying stimuli. Incongruity requires not merely a combination of stimuli that is novel, but a combination differing from, yet having components in common with one that the organism has learned to treat as more likely (Berlyne, 1960).

Berlyre (1963) and Connolly & Harris (1971) found that subjects looked significantly longer at congruous pictures. Incongruity has also been found to increase the mean amplitude of the GSR (Berlyne et al, 1963) and the duration of alpha desynchronization in the EEG (Berlyne & McDonnel, 1965).

(d) Conflict and Uncertainty

As stated earlier, Berlyne (1963) regards conflict between incompatible neural and ultimately motor response tendencies as one of the principal determinants of curiosity. Three properties that a degree of conflict measure should have are that conflict should increase with:

(i) the nearness to equality in the strength of the competing response tendencies.

(ii) the number of competing response tendencies,

(iii) the absolute strength of the competing responses.

(Berlyne, 1954, 1957a, 1957b; Brown & Farber, 1951).

Berlyne (1957a, 1957b) has secured evidence that all three of these variables influence one of the most sensitive indices of conflict, a lengthening of the reaction time (RT). However,

at this stage no studies have been conducted on the relationship between conflict as measured by a lengthening of the RT and other measures of curiosity.

The information theoretic concept of uncertainty is used almost synonymously with "flict by Berlyne (1963). According to information theory there can be no receipt of information without some initial uncertainty or entropy. The corresponding pyschological fact is, according to Berlyne, equally valid: "the receipt of information cannot be rewarding without some initial conflict and uncertainty".

According to Berlyne (1963, 1966) ambiguous stimuli, such as blurred pictures, induce subjective uncertainty, an aversive condition which results in heightened perceptual curiosity. The alleviation of this condition, through incoming information is held to be rewarding. Nicki (cf. Berlyne & Borsa, 1968) found that the replacement of a blurred picture with its corresponding clear version would reinforce an instrumental response in human subjects. Berlyne & Borsa (1968) also showed that blurred pictures resulted in an intensification of the orientation reaction as indicated by the duration of alpha desynchronization in the EEG. That both these effects depended on the subjective uncertainty of the blurred pictures is shown by the fact that these effects did not occur when a blurred picture was immediately preceded by a clear version of the same picture.

Other studies show an increase in epistemic curiosity with increasad subjective uncertainty. Berlyne (1962) carried out an experiment in which subjects attempted to answer a

number of multiple choice questions with 2, 3 and 4 alternatives. Subjects then rated how interested they were in learning the answers. Curiosity was found to increase with the number of alternatives possible. Crandall (1971), on the other hand, in a similar experiment, found that there was a non-monotonic relationship between curiosity and subjective uncertainty with the greatest curiosity occurring at intermediate levels of uncertainty. Clearly further studies are needed to clarify the issue.

B. Intelligence and Curiosity

A number of studies have attempted to relate scores on various curiosity tests to intelligence. Pielstick & Woodruff (1964) found that more intelligent children showed significantly more curiosity ($p<0,001$) as measured by the length of exposure of slides on a tachistoscopic exposure test. Using more or less the same method, Melchert (1967), however, found that brighter children looked shorter at more complex slides in a tachistoscopic exposure test ($p<0,05$). Cummings (1967) and Maw & Maw (1961) found small positive relationships between curiosity and intelligence (as measured by the Lorge-Thorndike test), while Day (1968), Langevin (1971) and Penney & Mc Cann (1964) and Penney & Rainehr (1966) found no relationship between intelligence and curiosity as measured in a number of curiosity questionaires.

However, as Penney & Mc Cann (1964) point out, lack of strong positive correlations between curiosity and

intelligence is partial evidence for discriminant validity. Campbell & Fiske (1959) state that tests can be invalidated by high correlations with other tests which purport to measure different traits.

C. Further Interindividual Differences in Curiosity

Observation of everyday life shows that individuals show reliable differences in the intensity and quality of their variation seeking. Some people are simply more interested in and disposed towards the occurence of change, novelty and surprises than others. One thinks here of the two well-known personality traits: "intolerance for ambiguity" (Frenkel-Brunswick, 1949), and "extraversion- introversion" (Eysenck, 1941, 1947). The individual with high intolerance for ambiguity is depicted as one who prefers familiarity, symmetry, definiteness and regularity. According to Eysenck (1953), extraverts require more stimulation and express greater stimulation-seeking behaviour than introverts in order to maintain optimal arousal levels. Some confirmation for this conclusion is found in the studies of Farley & Farley (1967,1970) who found a significant relationship between extraversion and stimulus seeking motivation as measured by the Sensation Seeking Scale (Zuckerman, Kolen, Price & Zoob, 1964) and the Change-Seeker Index (Carlington & Shimota, 1964). Phillip & Wild (1970) also found that, in a sensory deprivation situation, extraverts had a significantly higher need

for stimulation than introverts.

At the moment there is little evidence on which to base an explanation of the existence of individual differences in the intensity and mode of expression of curiosity. Berlyne (1960,1963) and Fiske & Maddi (1961) feel that individual differences in curiosity could be the result of differences in the individual's arousal potential. Early experience could also be an important factor. Adults exposed to a relatively great degree of variation in childhood may show a higher normal activation level than a person who has been restricted in this regard. There is certainly evidence from animal studies that a more variable early environment produces an adult organism that is perceptually and behaviorally more alert and capable of coping with changes in the environment (Thompson & Schaefer, 1961). Studies of children in orphanages (Dennis, 1960) have shown that children reared under unusually severe conditions of restriction are relatively inattentive, impul ,ve and limited in cognitive ability. Maltzman (1962) suggests that the intensity of the need for variation can be influenced by parental training practises. Parents who elicit and reward unusual responses are fostering a high degree of curiosity (cf. Maw & Maw, 1966; Saxe & Stolback, 1971).

5. Status of the curiosity construct

Although a large number of studies have been carried

out on the collative determinants of curiosity and the various other factors influencing curiosity, the interrelationships between these collative properties remain ambiguous, because Berlyne and his co-workers have, in general, limited themselves to a piece-meal approach, studying one variable at a time and few studies have attempted to interrelate the various types of curiosity measures in use and to show whether curiosity is unitary or multifaceted.

In an attempt to test the hypothesis that curiosity is a unitary construct, Langevin (1971) compared the performance of subjects on the Test of Specific Curiosity (Day, 1968) the Test of Reactive Curiosity (Penney & McCann, 1964), the Interest in Complexity Test and the Experimental Curiosity Test (Langevin, 1971). Two intelligence measures were also included to determine if the curiosity measures were distinct from IQ. Factor analysis of the results revealed 2 weak curiosity factors: Breadth of Interest (diverse curiosity) and Depth of Interest (specific curiosity). As a whole, curiosity measures were distinct from intelligence and from each other.

Langevin concludes that curiosity is a "simple label that is applied to observing, thinking, questioning, specific and diverse exploring and choosing, among other things." There is no reason why these types of behaviour should be interrelated to form some overall curiosity factor."

6. Summary and Conclusions

In this chapter an attempt has been made to put the study in historical perspective. It was pointed out that an increased

recognition of motivational sources other than hunger, thirst, sex or escape from pain, resulted in the formulation of numerous theories postulating a "need for sensory variation". Of these theories, that of curiosity, as put forward by Berlyne (1960), is the most widely accepted. Curiosity is seen as a state of heightened arousal brought about by the collative properties of stimuli (e.g. novelty, complexity, incongruity). Exploration of these stimuli reduces the curiosity drive. Berlyne (1960) further suggested that what these collative properties have in common in influencing curiosity is that conflict in one form or another is present. The considerable support for Berlyne's theory, found in recent literature, is reviewed in this chapter together with research on other factors which have been found to influence curiosity.

Although this study leans heavily on the theory of curiosity put forward by Berlyne, there are some differences in emphasis. Since the exact relationship between curiosity, exploratory behaviour and arousal is still in doubt, no attempt has been made to define curiosity in terms of arousal and in this study curiosity is seen as a motive to acquire or transform incoming stimulation under circumstances that offer no immediate value in terms of classic biogenic needs or acquired drives. Furthermore, although the 'conflict' hypothesis put forward by Berlyne is phenomenologically attractive, there is no direct evidence that conflict underlies the motivational effects of the collative properties of stimuli or that conflict, as defined by Berlyne, is in fact a unitary concept. If different

forms of conflict underlie the motivational effects of the various collative stimulus properties, the problem is no nearer solution.

In the literature reviewed in this chapter, it is usually assumed that curiosity is a unitary and universal construct. However, this assumption has not been substantiated experimentally. As so often happens when a new theory is introduced in psychology an enormous amount of research, usually focusing on some particular aspect of the theory is generated, while global hypotheses have to be neglected until more information on particular aspects becomes available. The theory of curiosity is no exception. No studies attempting to show whether the curiosity construct is unitary or multifaceted, by focusing on its principal determinants as outlined by Berlyne have been carried out. While novelty, complexity, incongruity, uncertainty and conflict have all separately been found to influence curiosity, no studies have attempted to show whether these collative properties are also related to each other. The only study (Langevin, 1971) in which the unitary nature of the curiosity construct is discussed, used a number of curiosity questionnaires, supposedly measuring experiential, specific and diverse curiosity, and a test of only one of the collative stimulus properties (complexity). Since the questionnaires themselves measured ways in which curiosity expresses itself rather than the basic factors underlying curiosity, it is not surprising that factor analysis revealed more than one factor. The question, therefore, is still open.

In the testing of his theory, Berlyne and other workers in the field have used only the domestic rat and American college student as subjects. Both groups of subjects are known to be highly curious. It may well be that his formulations are not valid for other groups of subjects (e.g. from a different culture).

More research into the interrelati hips between the collative determinants of curiosity in a wider population than previously considered is clearly needed before definite conclusions about the nature of curiosity can be drawn.

CHAPTER II

COMPARING CURIOSITY CROSS-CULTURALLY

1. Introduction

The aim of cross-cultural psychology is to study the effect of cultural factors on behaviour. Theoretical conceptions as to the nature of observed differences between cultural groups are likely to affect the research strategy employed and the interpretation of the results and it is therefore regarded as necessary to put the study in perspective.

Briefly there appear to be three main points of view in the literature with regard to the nature of observed psychological differences between cultural groups.

(i) The differences are genetic. Many older studies such as those of Fick (1939) and Porteus (1937) and some more recent ones (Jensen, 1969; Shuey, 1966, p.526) maintain that genetic racial differences in behaviour do exist.

(ii) The Environmentalists, (Strodbeck, 1964), on the other hand, assume that all ethnic differences can be explained in terms of culture and that under favourable conditions every individual is almost infinitely improvable (Tyler, 1965).

(iii) A third, at present more current point of view, (cf. Berry, 1966; Biesheuvel, 1972, 1972 (a); Fergusson, 1956; Tyler, 1965, p. 447) holds that all human traits, with the exception of a few physical characteristics that depend on genetic endowment alone, are produced through an

interaction of heredity and environmental influences. Attributes of behaviour are not regarded as completely genetically determined but rather seen as gaining stability during the course of development through interaction between an individual and his environment. Considerable support for this point of view has been found by Grant (1969), who, in a study of an African group in cultu. transition, found that an enriched environment brought about an improvement on cognitive tests and also a greater differentiation of abilities.

In terms of this point of view, there can be no such thing as a culture-free test because the abilities of man are themselves not culture-free (Fergusson, 1956, Frijda & Jahoda, 1966). However, the concept of the culture-fair test, the aim of which is to give no undue advantage to some cultural groups rather than others, while theoretically more satisfactory, has hardly been more productive. As Biesheuvel (1972) points out, the psychologist has insufficient knowledge to enable him to decide whether differences in observed behaviour reflect racial differences in genetic capacity or merely differences in physical environment. In addition these factors may interact in influencing the results of a test (Segall et al., 1966), so that it is extremely difficult to know whether the instrument one is using is culture-fair. This problem is discussed more fully later in this chapter but a completely satisfactory solution has yet to be found.

Another closely related theoretical issue which has important implications for methodology and interpretation

of results is whether the differences in the cultures being compared are quantitive or qualitative.

Berry (1969, 1972) and Eckensberger (1972) hold a viewpoint of "radical cultural relativism", namely, that one can assume no psychological universals across cultures. "Ideally each behaviour system should be understood in its own terms, each aspect of behaviour must be viewed in relation to its behavioural setting. It follows from this that the comparison of behaviour from different cultural settings is essentially a false enterprise, for we are comparing incomparables." (Berry, 1969).

Poortinga (1971), on the other hand, expanding on Kroeber's (1948, p.573) views on the "psychic unity of mankind", holds that it is unlikely that qualitative differences in the basic properties of behaviour will ever be found. Immediately observable differences are regarded as being to a large extent dependent on the "behavioural repertoire" which is at the disposal of a person in any particular situation. (Poortinga, 1972, p. 7).

Poortinga, thus starts off with the "null hypothesis" of no qualitative differences between cultural groups, while Berry and Eckensberger hold that one should never seriously entertain the null hypothesis (Eckensberger, 1972).

The difference between these two points of view seems to be mainly one of intent. Berry feels that the intention of cross-cultural psychology should not be a generalization of a result over cultural groups, whereas Poortinga feels that a comparison between the various cultural groups which

goes beyond a listing of differences in repertoire is possible.

From the point of view of generating cross-cultural research the hypothesis of no qualitative differences in behaviour between cultural groups is felt to be more productive and is, in principle, adhered to in this study. However, rigorous methodological requirements as to the kinds of data that are admissable should be laid down.

2. Methodological Considerations

A survey of the literature reveals that enthusiasm for the direct comparison of scores on psychological tests between different cultural groups has waned in recent years (Biesheuvel, 1972; Berry, 1969, 1972; Cronbach, 1972; Eckensberger, 1972; Irvine & Sanders, 1972). The multitude of difficulties encountered with respect to the translation of the instruments into the language of a different culture, holding motivation in the cultures being compared constant, and the selection of comparable samples, has led many psychologists in the field, to despair of ever arriving at psychological instruments which can be meaningfully compared across cultures.

Nevertheless, in view of the reasons given in the next section, it is felt that the collection of comparative data is important. However stringent criteria should be laid down as to the data that is admissable.

Most writers in the field call for some form of "functional equivalence" as a requirement for cross-cultural comparability. In general tests are regarded as being

functionally equivalent in respect of the cultures being compared if they measure qualitatively the same attributes (Poortinga, 1971) or refer to the same constructs or latent variable in the cultures being compared (Berry, 1969, 1972; Eckensberger, 1972).

These researchers call for all of the following in combination: the test should be homogeneous within each culture, according to some criterion of unidimensionality, the indices representing the difficulties of the items should have the same order in the cultures considered, the test should have the same factor loadings when the same battery is applied to each culture and factored, the test should have the same relationship with many external variables in each culture. (Berry, 1969; Eckensberger, 1972, Irvine, 1966, 1969; Irvine & Sanders, 1972, Poortinga, 1971; Przeworski & Levine, 1966). The requirements for comparability as set out by Poortinga will be discussed in some detail since analysis of the results of this study involves the determination of his criteria of item and functional Equivalence.

(a) Functional Equivalence According to Poortinga (1971, Appendix A) a test can be regarded as functionally equivalent for a certain group if it measures qualitatively the same attributes in the groups being compared. As a mutual check on the functional equivalence of two or more tests, Poortinga suggests comparison of the correlation values obtained between the respective tests. While differences in means between the tests do not affect the value of the correlation coefficient, and hence functional equivalence, it is

necessary that all items in each test be fairly homogeneous in that they measure the same complex of functions. Furthermore an additional requirement (Poortinga, 1971, p. 70) which adds strength to the functional equivalence of the tests is that correlation with other tests, not measuring the same constructs, should be the same in the groups being compared.

It should be pointed out, however, that intercorrelations are relatively unstable for small groups and that for meaningful comparison of correlation matrices, large samples, beyond the scope of most research, are required so that this method of analysis has limited applicability. A serious deficiency of the concept is thus that conditions for its verification (i.e. homogeneous tests, large samples) are often unattainable.

Functional Equivalence may also be investigated by means of factor analysis. A necessary requirement here would be that the factor structure of the two populations is similar. A similar requirement is suggested by Eckensberger (1972). However the same restrictions apply as in the analysis of functional equivalence by comparison or correction matrices. The conditions for functional equivalence as defined above are very similar to Berrien's (1967) requirement for construct validity, in which he advocates testing whether the variability of measures taken from two cultures are related to other variables within their respective cultures, in a way that conforms to some theory of the manner in which they ought to operate.

(b) Score Equivalence. Even if a test satisfies the

requirements of functional equivalence in certain groups, a difference in performance does not necessarily reflect a quantitative difference in respect of some attribute the test is measuring. Score equivalence requires that the scale on which attributes are measured must be the same for the groups being compared i.e. The predicted score on one test must be the same for all subjects who have an equal score on the other test irrespective of whether they belong to the same group or not. Score equivalence can be studied by means of linear regression techniques.

Although tests for score equivalence were not carried out in earlier cross-cultural studies, most researchers implicitly assumed conditions similar to score equivalence to exist in their data.

(c) Item Equivalence This refers to the comparison of statistical relations within the same test for the groups involved in a comparative study. Item equivalence should be questioned if the order of item difficulty is significantly different for the groups being compared. This procedure was followed by Irvine (1966) who found a correlation of 0,695 between British and African school children in one of his tests. He feels that the correlation was strong enough to suggest that the construct being tested was shared by, though not identical in the two groups.

One difficulty in the analysis of the item equivalence of a test by this method is that correlation of item difficulties presupposes a linear relationship between scores on a test and the attribute being measured. For

example, in one of the tests in this study, a curvilinear relationship between complexity and item preferences was anticipated. In this case, correlation of item difficulties cannot be regarded as a test of item equivalence and different methods must be used.

These requirements for comparability across cultures, although extremely rigorous still leave some loopholes. The evaluation of comparability takes place with reference to other tests or criteria. It is possible that analysis of functional equivalence by correlational methods, for example, can show satisfactory results in respect of short-term criteria, while this may no longer be the case when a check is made in terms of long term criteria, possibly more representative of the attribute concerned.

A similar argument applies to the use of factor analysis in the determination of functional equivalence. Performance on a test calls for many attributes in combination. Attributes universally present among subjects in one culture may vary greatly in another culture, as a result of motivation, attitudes or social response to a test. The implication is that factor analysis can go "only a small distance toward clarifying a structure of abilities" (Cronbach, 1972).

Another difficulty with the concepts, functional, score and item equivalence is that they can never be conclusively proved, only confirmed or disproved. Furthermore, even when one accepts that a test does not measure the same behaviour in the populations studied, two explanations are possible: either the separate population do not possess the same att-

ributes, or, different parts of "basically equal networks" are being compared (Poortinga, 1971, p. 7). In view of the assumption that no qualitative differences between different groups exist, the second explanation must be accepted. So comparability of tests can never be proved or even conclusively disproved; the procedures, outlined above, only increase or decrease the probability that the groups being compared possess the same set of attributes.

As Cronbach (1972) points out, such rigorous requirements, as are in general postulated for cross-cultural comparison are not likely to be met. Evidence from two studies (Poortinga, 1972; Poortinga and Spies, 1972) shows that even in the comparison of simple stimuli in two cultures, functional and item equivalence of scores may not be obtained. Nevertheless, analysis of the results in these terms is of great help in separating less successful attempts from more promising ones and lead the researcher to at least regard his results with reservations and caution in interpretation. A review of older and less systematic studies (cf. Duijker and Frijda, 1966) shows that in proportion to the immense effort that has gone into these studies, the results have been dissappointing. Whether the more rigorous criteria laid down by more recent researchers will yield more fruitful results remains to be seen.

3. Some Reasons for a Cross-Cultural Comparison of Curiosity

One of the most important reasons for carrying out a cross-cultural investigation in psychology is the testing of hypotheses, usually developed in Western culture, to assess

their universality (Biesheuval, 1958; Whiting,1954). With reference to the theory of curiosity put forward in Chapter I this can be considered especially relevant. Berlyne (1962a) has proposed that the curiosity drive is innate. However, in the formulation of his theory, he has relied almost exclusively on data obtained from the American college student. As a result many of his formulations may lack universality, particularly with respect to the collative variables influencing curiosity and the relationship between curiosity and conflict. In this connection a cross-cultural investigation of curiosity is felt to be relevant.

Another objective of psychological research among Africans is to gain a greater understanding of their behaviour and to determine the extent to which it is modifiable (Biesheuvel, 1958; Frijda & Jahoda, 1966; Provins et al., 1967). This research is, of course, particularly relevant when Africans come into contact with Western civilization and must adapt to living in a Western culture. Although considerable attention in cross-cultural psychology has been concentrated on social, perceptual and personality issues, very little work has been done on the more basic dynamics of behaviour, e.g. studies of motivation. There are two popular conceptions about the African: that he is less "intelligent" and that his is "slower in temperament" or "lazier" than the European (Carothers, 1953). Although a large number, albeit inconclusive, studies have been carried out on the first conception, little or no work has been done on the second idea - that the African is operating at a lower level of arousal or motivation than the European. The

implications of this second conception for the daily work situation, job selection and education need no emphasis.

4. Factors affecting the development on Curiosity in Africans

In Chapter I, some effects of social, environmental conditions and personality factors on curiosity were discussed. While it is not within the scope of this exploratory study to try to untangle the genetic and environmental factors which may differently affect the manifestation of curiosity in the two cultural groups, some mention of cultural factors which may influence the appearance and strength of the curiosity motive in the two groups being studied should nevertheless be made.

The early childhood experiences of African and European children differ radically. Our western culture is one which stresses enterprise and originality from childhood on. The European child is brought up, in early years, fairly directly by his parents. From an early age, he is introduced to balls, building blocks and mechanical toys. He is encouraged to show curiosity and ask the question "Why?". Traditionally, the African culture is completely different. Work organization, in the tribal setting is communal and the tribe stresses conformity to the group (Carothers, 1953, De Ridder, 1961; Glass, 1961, 1963). Curiosity and Investigatory behaviour are discouraged. (Grant, 1969, p. 46; Schiff, 1970, p.6). Following weaning, the African child suffers a period of relative neglect (Biesheuvel, 1943; Carothers, 1953; Grant, 1969). He is usually brought up by his grandparents and during the day is left very much to his own devices and the company of his

brothers and sisters. Toys other than those crudely made by the children themselves are conspicuously absent. (Biesheuvel, 1943, 1972). The African in the urban areas is in a state of transition between the tribal and European cultures (De Ridder, 1961). The majority of African families, although their environment is not as disadvantageous as the rural African's, live outside the European residential areas in the townships. Gardens and houses are small and children are forced to play on the streets. They are left for the most part of the day without any supervision as both parents go out to work. Biesheuvel (1943, p. 99) has written: "Hence from the second or third year onward, the African child grows up in an environment which is not only unstimulating on various accounts but also lacks sympathy between adult and child which is a sine qua non of intellectual development." Conditions at school are little better. Classes are so overcrowded (1 teacher to 60 pupils, S.A. Statistical yearbook, 1968) that there is little or no individual attention. When one considers these facts in relation to Piaget's (1936) 3 broad stages of child development one sees that during the period of causality, from 3 to 8 years of age, when childish thinking is concerned with "why", the African child is left very much to his own devices and there is evidence that these conditions detrementally affect the development of curiosity. Schiff (1970) in a study on manifest curiosity among Ganda preschool children found that these children scored low relative to the maximum possible on all measures of curiosity. She attributes these results to "caretaker attitudes towards curiosity", the dearth

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