A COMPARATIVE DEVELOPMENTAL STUDY OF THE FEAR OF SNAKES

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ABSTRACT

This study was conducted to determine the influence of age and culture on the fear of snakes. Five age groups, consisting of 20 White and 20 Xhosa subjects each, were tested. In addition to a behavioural and a GSR measure of fear, questionnaires were applied to determine the extent of the subjects' personal and vicarious aversive experiences of snakes and attitudes towards snakes. The behavioural measure showed a significant decrease in the fear of snakes between the 9 - 11 year and the 14 - 16 year White groups, while, for the Xhosa subjects, the fear of snakes increased significantly between the age groups 14 - 16 years and 18 - 20 years. The GSR measure showed a consistent level in the fear of snakes for White subjects. For the Xhosa subjects the mean GSR score for the 18 - 20 year group was considerably higher than the means for the other age groups. The intensity of the fear of snakes for White and Xhosa subjects of the same age was remarkably similar. Xhosa subjects had significantly more negative attitudes towards snakes than White subjects. This finding was explained in terms of Whites having had greater opportunities to obtain factual information about snakes. No significant relationships were found between (a) the measures of the extent of the subjects' aversive experiences of snakes; (b) the degree of negative attitudes towards snakes; and the measures of the fear of snakes. On the basis of these measures, the etiology of the fear of snakes cannot be explained in terms of aversive experiences with snakes *per se*. The striking similarity of responses to a live snake by subjects from two widely different cultures suggests caution in an over-hasty dismissal of the theory of an innate fear of snakes.

1. INTRODUCTION

> And the Lord God said unto the serpent,
> cursed art thou ... above every beast of the field,
>
> Genesis 3:14

> The voice of my education said unto me
> He must be killed ...,
> For he seemed to me again like a king,
> Like a king in exile, uncrowned in the underworld
>
> D.H. Lawrence, Snake.

There is convincing evidence that throughout man's past he has reacted intensely to the snake. In many instances the snake has, as a cultural symbol, played a significant role in the everyday lives of men. The snake has been worshipped, feared, revered and hated. It has appeared more than any other animal in myths, legends and folklore (Morris and Morris, 1965).

The snake has been assigned properties of supernatural wisdom, fertility, good fortune, everlasting life and the embodiment of the spirits of the deceased (Fitzsimons, 1962). The attributes of the snake, particularly the unfavourable ones, have been consistently amplified to ridiculous proportions. Man's imagination has converted snakes into dragons and sea-serpents. The size and longevity of snakes has been wildly exaggerated and many completely erroneous characteristics have been ascribed to the snake (Klauber, 1956).

This dissertation is concerned with the fear of snakes. With the advent of J.B. Watson and behaviourism, the theory of instincts was discredited and the idea that humans, and many animals, particularly the primates, have an instinctive fear of snakes became unpopular. While the theory of an innate fear of snakes has largely been discredited, there is convincing evidence that, at least in certain Western countries,

the fear of snakes is widespread and irrationally intense. Klauber (1956) mentioned that the fear of snakes had reached such irrational proportions in some parts of the U.S.A. that many newspapers and magazines refused to print pictures of snakes, nor could one be shown in a cinema without public protest.

Data provided by this study should be of interest for several reasons. Relatively little research has been conducted on the fear of snakes in humans, and large gaps remain in our knowledge of this topic.

Evidence has been provided showing that the fear of snakes amongst children in Great Britain and the U.S.A. is widespread. Data will be provided on the prevalence and intensity of the fear of snakes in South African children.

A comparison of the intensity of the fear of snakes in different cultures could not be found in the literature. This study will be concerned with the fear of snakes in two cultures - White South Africans and Xhosas. A number of social anthropologists have made interesting remarks about the Southern Nguni (of which the Xhosas are members) having an intense fear of snakes. Hoernle (1937) stated that Xhosas are extremely superstitious about snakes and associate them with the manifestation of ancestors and witchcraft. While instinct theories no longer hold sway, if similarities in the fear of snakes across widely different cultures are proved, it would have implications for the nature-nurture controversy.

2. THE FEAR OF SNAKES IN ANIMALS

2.1. Introduction

There are considerably more published studies on the fear of snakes in animals than in humans. One obvious reason for this imbalance is the possibility of experimentally controlling independent variables in laboratory studies on animals which would be quite impossible in studies on humans.

Studies on the fear of snakes in animals have, apart from a few exceptions, used primates as subjects. Only one experimental study of the fear of snakes in non-primates could be found in the literature.

Implicit in several of these studies has been the conviction that a knowledge of the basis and generality of the fear of snakes in primates would be of relevance to an understanding of the fear of snakes in humans. The designing of an experiment to establish the etiology of the fear of snakes in humans is virtually impossible. Marks (1969) stated that because of these experimental problems attention has been focussed on primate studies.

2.2. The Fear of Snakes in Non-Primates

Klauber (1956) surveyed many of the early natural histories of the U.S.A. and found that it was generally believed that all animals, including the European horse, are frightened of the rattlesnake. However, Klauber reported that more objective modern writers, with one exception, stated that the intensity of fear expressed by horses is dependent upon the circumstances under which the rattlesnake is discovered. For example, Barnes (1933) stated that horses only become frightened when rattlesnakes rise into their striking coil and sound their rattles. Other writers, for instance Bogert (1932), reported horses showing no fear of rattlesnakes. He held a rattlesnake in front of 25 horses in a stable and found that only

one of them showed even mild interest in the snake.

Several authors were cited by Klauber (1956) claiming that buck deer and cattle were not afraid of rattlesnakes even after they had been bitten. Teale (1951) observed a kitten showing no fear in the presence of a rattlesnake.

It has been reported that rats show no fear of snakes when introduced into their cages. In fact, if rats are left in snakes' cages overnight, they often do considerable damage to the reptiles' skin.[1]

The Experimenter confronted three hamsters with a writhing, 0.75m snake. No avoidance behaviour was shown by the hamsters.

Klauber (1956) found the literature on the fear of snakes in dogs to be equivocal. Some dogs were reported to attack and kill rattlesnakes with impunity, while other dogs were extremely afraid of these snakes.

An experimental study by Plutchik and Stelzner (1966) involved the presentation of 17 discrete stimuli to four different breeds of dogs. Each dog was isolated in a special test chamber and response measures to each stimulus were obtained. Significant breed differences were found on most measures, including responses to a rubber snake.

2.3. The Fear of Snakes in Primates

2.31. Simple Studies Without Isolating Independent Variables

Many of the early studies on primates' fear of snakes were conducted in zoos. These studies aimed simply to demonstrate the presence or absence of this fear in various primate species, without isolating and controlling independent variables which were to become the concern of later studies. The only recent publication presenting anecdotal information on the fear of snakes in primates is that of Morris and Morris (1965).

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[1] Personal communication from N. Schaefer, herpetologist at the Port Elizabeth Snake Park and Museum.

The first reports of the fear of snakes in chimpanzees appeared before 1850. Simple tests were conducted at the London Zoo in 1835, and showed that a young chimpanzee became terrified when it looked into a basket and caught a glimpse of a python.

Darwin (1873) reported that when a living fresh-water turtle was placed in the same cage with monkeys, they showed "unbounded astonishment and some fear". Darwin expressed surprise at how much less fear was exhibited in the presence of a turtle than in the presence of a snake. On the other hand, some of the larger baboons appeared to be equally terrified of a turtle or a snake.

Ten years later, Darwin reported further studies conducted in the London Zoological Gardens. When he carried a stuffed, coiled-up snake into the monkey house, the vast majority of the animals became extremely agitated. When a stuffed snake was left in one of the cages, the monkeys formed a circle around it, but were obviously afraid. Darwin also introduced various other objects, such as a fish, a mouse, and a turtle, into the monkeys' cage. While the monkeys were initially frightened, they soon approached and handled the objects. A snake in a paper bag was placed in the cage. One of the monkeys immediately approached the bag and peeped into it. As soon as it caught sight of the snake it dashed away. This procedure was repeated by the other monkeys.

Mitchell and Pocock (1907) conducted a number of studies in the London Zoological Gardens. These studies were similar to those of Darwin. Mitchell and Pocock found that the majority of animals had no specific fear of snakes, the notable exception being the primates. When the monkeys caught sight of a live, active snake being held outside their cage they immediately fled back shrieking in terror.

The lemurs, on the other hand, showed no fear of snakes. When they saw a live snake being held outside their cage they crowded to the front

of the cage displaying great interest. They did not withdraw when the snake was brought so close to them that its tongue almost touched their faces. Morris and Morris (1965) pointed out the interesting fact that the lemurs, being confined to Madagascar, are the only major primate group not co-existing in the wild state with highly venomous snakes.

Mitchell and Pocock found that South American monkeys were less consistent than Old World monkeys in their fear of snakes, sometimes showing only very slight fear. The Old World monkeys of all the genera kept at the Zoological Gardens at this time recognized the snakes instantly and "bolted panic-stricken, chattering loudly and retreating to their boxes or as high up as possible in the larger cages". Some very young babies were found to be indifferent to snakes.

Further tests conducted by Mitchell and Pocock revealed that Anthropoid Apes were frightened by any strange creature. When one of the chimpanzees passed large nematode worms in its faeces, the other chimpanzees became terrified. Earthworms had a similar effect. It was suggested that the chimpanzees might have mistaken the nematodes and the earthworms for snakes. However, later tests revealed that mice, cockroaches and guinea pigs were also greatly feared. The authors maintained that apart from this general fearfulness, monkeys (excluding lemurs) have a specific fear of snakes. Mitchell and Pocock suggested that "it is probable that human beings have inherited this specific fear of snakes from their anthropoid ancestors".

Later evidence led Mitchell to withdraw his contention that the fear of snakes is instinctive in the primates and that humans have inherited this instinct "from our ape-like ancestors". Mitchell (1922) published the findings of tests conducted on a "just-weaned" chimpanzee. When confronted with an active tree boa, the chimpanzee leaned out towards the snake, and showed no fear when the snake's tongue touched its face.

Subsequently, the chimpanzee handled a large King snake quite freely and played with it. On the basis of this evidence Mitchell concluded that "it would appear that the dread of snakes is not instinctive in chimpanzees". Furthermore, "the alternative is to suppose it an acquisition due to experience or the imitation of other chimpanzees which have had individual experience".

Yerkes and Yerkes (1929) cited evidence showing that chimpanzees generally fear snakes. They remarked that the fear of large, strange animals, such as cattle, is commonly found in chimpanzees. Because of the absence of essential data, Yerkes and Yerkes would not commit themselves to the view that the fear response in primates, to specific animals, is innate. They favoured the hypothesis that the avoidance behaviour pattern in the anthropoids consists of "a basic reactive tendency and capacity which increases in its adaptiveness with experience and use".

Anecdotal evidence was gathered by Morris and Morris (1965) which made them sceptical of some of the previous experimental data supposedly refuting the hypothesis of an inborn fear of snakes in primates. The authors reared a baby chimpanzee captured when extremely young. This animal did not see a snake from the time of its capture until testing.

The chimpanzee was slightly scared when first presented with a length of rubber tubing, but soon began playing with it. Snake-like zig-zag markings were painted on the tube and then returned to the chimpanzee. He retreated fearfully, but then advanced and struck the "snake" just behind its "head". Immediately after the blow, the chimpanzee jumped back, away from the "snake". A realistically wriggling, mechanical snake elicited immediate fear. When it stopped moving, the chimpanzee moved towards it and flicked it away from himself with his hand. After repeated presentations of the toy in the immobile state, the chimpanzee very cautiously lifted it up by the tip of its tail. The authors concluded that

"it is hard to believe that he had learnt how to deal with snakes from his mother in the wild".

Morris and Morris (1965) gave an extremely interesting account of the responses of two orang-utans to a live snake. These two animals had been reared in captivity from tiny babies and had not seen a snake during six years in captivity. When they accidentally came across a tame python in a television studio they immediately took refuge high up in the studio rigging. Other strange animals did not elicit this panic reaction.

The reactions of the rhesus monkeys to a live snake were observed by Tinklepaugh and Hartman (1932). A large garter snake was introduced into a paddock with two female rhesus monkeys, each of which had a baby. Neither the mother nor the babies showed any fear of the snake. The mothers followed the snake around the cage and only when it moved quickly, after being touched, did the monkeys show any signs of withdrawing from the snake. The babies (4 - 6 weeks old) showed a great deal of interest in the snake and would have grasped it or stood on it had they not been restrained by their mothers.

The researchers whose work is reviewed in this section were unable to conclusively decide whether the fear of snakes in primates is innate or learned. As Yerkes and Yerkes (1929) pointed out, the available evidence permitted the fear of snakes to be explained either in terms of instinct or as being due to "social tradition, parental tuition, and other forms of individual experience".

The early studies, and the type of data provided by Morris and Morris (1965), lacked the rigorous experimental control of independent variables essential for determining the factors underlying the fear of snakes. Darwin's studies indicated that the age of the subjects might be an important variable in the fear of snakes, but this was not experimentally investigated

until 1936. None of the early studies used subjects whose life history was completely known. This precluded the opportunity of having a complete knowledge of the animal's experience of snakes.

In addition to failing to control for "subject variables", these early studies neglected to control for "fear stimulus variables", e.g. the size, movement and proximity to the subject of the snake used in the tests.

2.32. More Recent Studies on the Influence of Independent Variables

More recent studies of the fear of snakes in primates have been concerned with investigating the influence of subject variables as well as variables related to the stimulus situation.

In order to assess these studies their basic methodological differences must be considered. One of the most important is the method of presenting a test object to the subject.

Yerkes and Yerkes (1936) introduced a live snake, as well as a number of other animate stimulus objects, directly into the subjects' cage. Several inanimate stimulus objects were placed in the wire-netting wall of the cage, near the floor.

The subjects in Haslerud's (1938) study were first habituated to reaching through the wire wall of their cage to obtain a piece of food from a platform. Food was placed on a small trolley behind a screen and then moved on runners to the cage wall. When the subject had become accustomed to obtaining food in this way, a stimulus object was placed on the trolley a certain distance from the food. The trolley was then moved towards the cage. Because the youngest subjects became emotionally disturbed when the trolley emerged from behind the screen, the food and stimulus object were simply placed within reaching distance of the subject on the platform.

Essentially the same procedure as Haslerud's was adopted by Joslin,

Fletcher and Emlen (1964) whose subjects were tested in a Wisconsin General Test Apparatus (WGTA). The live snake and other stimulus objects used were individually clamped to the movable tray which also held a food reward. The tray was then moved from behind a screen towards the subject's cage.

McCulloch and Haslerud (1939) placed their subject in a cage at the one end of which was a compartment separated from the subject by an opaque screen. When the screen was lifted the subject could advance to obtain a food reward. Each trial consisted of the stimulus object being placed just behind the food reward. The screen was then lifted and the subject's responses recorded. This procedure is substantially the same as that used by Haslerud (1938) except that the stimulus object was in the cage with the subject rather than on a platform outside the cage.

The subjects in Hebb's (1946) study remained in their living cages throughout the experiment. A presentation box, containing the stimulus object, was placed outside the cage, but in full view of the subject. The subject viewed the stimulus object for 15 secs. after which the box was closed and moved 6 ins. closer to the cage. A further exposure of 15 secs. was given.

Masserman and Pechtel (1953) simply held the stimulus object outside the glass front of their experimental apparatus, and noted the reactions of the rhesus monkeys inside.

Wolin, Ordy and Dillman (1963) tested each of their subjects inside an aluminium transport cage. One side of the cage consisted of a sliding panel of clear plastic. The entire cage was enclosed within a cardboard screen for testing. White towels were spread immediately in front of the transparent panel and each stimulus object was presented on the towels. Observations were made by the experimenters through small holes cut in the cardboard screen.

An entirely different piece of apparatus, to those described above, was used by Butler (1964). The box containing the subject had two transparent windows located opposite one another on the walls of the box. Another box, the same size as the one housing the subjects was placed 2 ft. in front of each window. These boxes had a front of transparent plastic and contained the stimulus objects. The experimental room was lightproof. In the vicinity of the windows of the subject's box exciter lamps and photomultipliers were mounted. The subject could cause the box, containing the stimulus object, to be illuminated by placing his head close to the window facing the box.

The test unit employed by Green (1965) consisted of two connected chambers, one housing the subject and the other for the presentation of the test objects. The chambers were separated by a moveable opaque screen, and a sheet of plexiglass in which a hole was cut to allow the subject to obtain food and handle the stimulus objects. A wooden tray, baited with a small amount of favoured food, could be moved from the far end of the presentation chamber towards the screen. After the monkey had become used to accepting food from the tray, a stimulus object was placed with the food on the tray. The opaque screen was lifted and the tray was moved towards the subject positioned behind the plexiglass screen.

These different methods of presenting the stimulus object to the subject makes a direct comparison of the findings of these studies difficult. A snake introduced directly into the cage of a primate could produce a more intense avoidance reaction than when a snake is presented behind a transparent screen.

Different criteria for fear were used in these studies. Some of the researchers used the criterion for the fear of snakes as the failure to approach or contact the snake. Others used the criterion of avoidance or escape behaviour. Haslerud (1938) established the criterion for fear as

the failure to obtain, or the delay in obtaining, food placed in proximity to a snake. Butler (1964) determined whether a subject was afraid or not by the length of time a feared object was viewed or the number of responses made to illuminate the chamber containing the test object and, therefore, keep it in sight. In addition various postural orientations, highly focalized or sustained attention, facial expressions, gestures, alarm vocalizations and excretions, have been used as indications of fear arousal.

With these various criteria of fear it is probable that behaviour regarded as indicating fear in one study may not indicate fear in another study. This must be remembered in comparing the results of the studies below.

Independent Variables Related to the Subjects

Age. Yerkes and Yerkes (1936) tested 29 chimpanzees ranging in age from approximately 1 year to over 20 years. Subjects less than 2 years old were classified as infants; those between 2 - 7 years as children; those over 7 years as adults. Several objects were placed inside the cages of the subjects who were tested individually. The fear response to each object was rated on a 9-point scale. No significant differences were found between the infants and the children in their reactions to a glass snake (legless lizard). Most of these subjects definitely avoided the glass snake but showed no panic. However, the adults were significantly more afraid; 15 out of 16 uttered cries of alarm and attempted to hide from the glass snake.

Yerkes and Yerkes (1936) conceded that their study was "frankly crude". All the infants had been born in captivity, while the other subjects, although spending most of their lives in captivity, had been born in the wild. All the children and adults were familiar with snakes, but this probably did not apply to any of the infants.

These differences in the early experience of subjects could possibly account for the difference in the fear of snakes between infants and adults. However, the apparently similar early experience of the children and the adults seems to indicate that variables other than early experience accounted for the increase in the fear of snakes with age.

Haslerud (1938) tested a group of 12 chimpanzees divided into a group of 7 children (1 - 3 years) and a group of 5 adults (9 - 16 years). The adults had been captured in Africa, whereas the children had been born and reared in the laboratory. The chimpanzees' reactions to the presentation of a negative stimulus object with favoured food were rated on a scale of avoidance reactions. Considerable individual differences in the reactions to a live snake were found in both age groups. However, no significant difference was found between the mean avoidance scores for the children and the adults. Haslerud concluded that age is not related to differences in the intensity of the fear of snakes. Rather, these differences could best be accounted for in terms of individual differences in experience and conditioning.

Wolin, Ordy and Dillman (1963) presented a number of stimulus objects, including a toy snake and a live snake, to rhesus monkeys ranging in age from 2 months - 9 years. No significant differences between age groups were found with respect to approach or random responses upon presentation of the stimulus objects. The infants did, however, show significantly more avoidance responses than the adolescent and adult subjects, over all test objects including the toy snake and live snake. Wolin et. al. reported an exceptional variableness in the monkeys' responses to the test stimuli. At times they were calm and curious, while at other times they were extremely fearful. In most instances this fearfulness did not appear to have any specific relation to the stimulus objects.

Joslin, Fletcher and Emlen (1964) found no age effects in the responses

of laboratory- and wild-reared rhesus monkeys to a moving, live bull-snake or to seven objects varying in likeness to a snake.

Early experience. The comparison of the behaviour, under comparable conditions, of subjects isolated from birth with the behaviour of socialized subjects, would provide clues regarding the significance of social conditioning in the development of the fear of snakes.

Observations made by Jacobsen, Carlyle, Marion and Yoshioka (1932) indicated that a chimpanzee infant, reared in isolation from its kind, responded to a live snake without any evidence of fear and with obvious curiosity.

McCulloch and Haslerud (1939) tested a young chimpanzee born in the laboratory and isolated, within a few hours after birth, from other chimpanzees. The subject was tested at the age of 7 months and then at 15 months. Testing was conducted under similar conditions to those in Haslerud's (1938) study. A significant decrease in avoidance behaviour towards a live snake was found between the two testings. Avoidance during the first test was very mild, being marked by the complete absence of screaming, urination and defecation. No avoidance was shown during the test at 15 months. The authors stated that, although they found great difficulty in comparing the degree of fear in animals of different ages, the impression was clear that the isolated chimpanzee showed a lower level of fear than the subjects in Haslerud's (1938) study.

Green (1965) conducted a comprehensive study on the influence of early experience on reactions of rhesus monkeys to 10 sets of stimuli including a life-like replica of a snake. Four groups of subjects were tested : Maternally separated juveniles (mean age 24 months); dark-reared juveniles (mean age 18 months); juveniles maternally reared in the wild for at least 8 months (mean age 18 months); and wild-reared, sexually mature adults. The testing procedure was similar to that of Haslerud (1938).

Separate data for responses to the snake stimulus were not provided. However, it was generally found that maternally separated juveniles and the dark-reared juveniles showed more fear in the presence of the test stimuli than the non-deprived groups.

The importance of studying the effects of wild- or laboratory-rearing on the fear of snakes was recognized by Mitchell (1922), but was not investigated until 1936 by Yerkes and Yerkes. However, in Yerkes and Yerkes' study the variable of early experience was confounded with the age variable. No significant differences, in the response to a snake, were found between laboratory-reared infants (under 2 years of age) and wild-reared children (2 - 7 years).

Hall (1962) conducted a series of experiments on a tame juvenile baboon and a wild juvenile baboon from the same area of South-West Africa. When glass snakes were presented to the two subjects, the tame juvenile reacted with fear and avoidance, while the newly captured juvenile ate the glass snakes without hesitation.

Wolin, Ordy and Dillman (1963) used laboratory-, zoo- and jungle-reared rhesus monkeys. A comparison of the responses of the laboratory- and zoo-reared monkeys with jungle-reared monkeys revealed no statistically significant differences between the two groups with respect to all the stimulus objects including a rubber snake and a live snake.

The most comprehensive study on the reactions to snakes of laboratory- and wild-reared rhesus monkeys was conducted by Joslin, Fletcher and Emlen (1964). Two types of observations were made of the subject's behaviour in the WGTA : (1) The latency of the reaching response; and (2) any emotional disturbances. The wild-reared subjects reacted with longer latencies than those of the laboratory-reared subjects to a live snake and various snake models. There were no significant intergroup differences in latency of response to a straight tube, block of wood and food. Wild-

reared monkeys showed more emotional disturbances than laboratory-reared monkeys to the live snake, snake models and rubber tubing.

The data provided by Joslin et. al. clearly support the hypothesis that laboratory-reared and wild-reared rhesus monkeys differ in their reactions to both a live snake and various snake models. Generally, wild-reared monkeys exhibited strong avoidance responses to the live snake, while laboratory-reared monkeys generally exhibited weak avoidance responses. Approximately 50% of the wild-reared monkeys showed strong avoidance responses to snake-like objects; the remaining 50% showing weak avoidance responses. Virtually none of the laboratory-reared monkeys showed any apparent avoidance responses to the snake-like objects.

These findings strongly suggest that the rearing environment has a definite effect on rhesus monkeys' responses to snakes. However, Joslin et. al's. study does not demonstrate the mode of action of the rearing environment and several alternative explanations could account for the findings.

Geographical Variables. Field studies by Hall indicated that baboons living in certain areas of South-West Africa, and those living in the Cape Peninsula, reacted in quite different ways to snakes. Hall (1962) reported that baboons in South-West Africa ate scorpions, centipedes and, of particular interest, snake-like legless lizards and two common species of back-fanged snakes.

By contrast, groups of baboons in the Cape Peninsula gave snakes a wide berth. On one occasion Hall observed an individual baboon leap with all four limbs clear of the ground upon suddenly seeing a snake. However, Hall at no time found any indication of a group of baboons showing an extreme fear of snakes.

Independent Variables Related to the Fear Stimulus

The research to be reviewed in this section deals with the influence

of independent variables related to the snake presented to the subject, as opposed to the previous section's concern with subject variables.

The "realness" of the stimulus. A number of researchers have studied the responses of primates to stimulus objects varying in likeness to a snake.

A study by Hebb (1946) provided data on the responses of chimpanzees to two stimuli varying in verisimilitude to a snake. One of the stimulus objects was a rubber tube, ½ inch in diameter, 24 inches long, with a roughly carved wooden snake's head at one end. A length of string inside the tube could be manipulated to create snake-like movements without apparent external agency. The other stimulus was a realistic wax replica of a coiled, 24 inch snake.

The findings of this experiment are of great interest. Only three out of the 30 subjects responded with any indication of fear of the rubber tube, while 21 of the chimpanzees responded with fear to the wax replica of a snake.

Wolin, Ordy and Dillman (1963) presented four test stimuli to 14 experimentally naive rhesus monkeys. Two of the stimuli were a toy rubber snake approximately 15 inches long and a live garter snake 18 inches long. Over all the days of testing, the subjects did not exhibit any statistically significant differences in approach or avoidance to the toy snake and the real snake. Wolin et.al. omitted to provide information on the colour and markings of the toy snake and on whether the live snake moved or not during the testing.

In a comprehensive study of the influence of the "realness" of the test stimulus, Joslin, Fletcher and Emlen (1964) presented the following nine test stimuli to 58 rhesus monkeys : (1) A moving, 2 ft. long, live bullsnake; (2) a non-moving, sinuous, lifelike model of this bullsnake; (3) another lifelike model without sinuations; (4) a sinuous model with only

one of the snake's two colours; (5) a straw-coloured sinuous model; (6) a sinuous, black, 2 ft. long rubber tube; (7) a straight, black, 2-ft. long rubber tube; (8) a plain, rectangular, block of wood; (9) food.

The following are the approximate percentages of wild-reared subjects which showed any sort of emotional disturbance to the nine stimulus objects : (1) 90%; (2) 65%; (3) 75%; (4) 65%; (5) 72%; (6) 28%; (7) 20%; (8) 7%; (9) 0%. The percentages for laboratory-reared subjects were significantly lower but showed essentially the same trend.

Proximity of the stimulus. Included in several studies has been data on the influence of the physical proximity of the fear-provoking stimulus on reactions of primates.

In Haslerud's (1938) study, the stimulus objects were presented at two distances from the food. The "near" portion of the stimulus object was 10 cm. beyond the food. The "far" position was 90 cm. to the opposite side of the platform to the food.

The findings were rather surprising. With only one exception, the refusals of food were equal or greater in number when the mounted snake and live snake were presented in the "near" position than in the far position. The difference was not statistically significant. Haslerud suggested that the positioning of the stimulus object 90 cm. from the food might have been too close for a clear differentiation from the "near" position.

In Butler's (1964) second group of experiments particular attention was paid to the effects of the proximity of the stimulus on the responses of the subjects. Each rhesus monkey was tested in a completely dark box which could be temporarily illuminated by pulling a chain. It was found that the subjects illuminated the test box about as frequently when a snake was in an adjoining plastic box as they did when there was no stimulus object in the plastic box. When the barrier was removed between the subject's box and the snake, the monkeys actively avoided the snake. When

the snake and the monkey were placed in the same totally dark box, the monkey tended to keep the box illuminated as much as possible. Butler interpreted this as an adaptive response by the monkey to keep the snake in view. The monkey had to know where the snake was before it could be avoided. However, two monkeys failed to increase the period of illumination in the presence of the snake. Without direct experimental support, Butler suggested that the subjects' level of fear was so high that it precluded an adaptive response.

Butler's experiments clearly showed that rhesus monkeys made no apparent attempts to avoid a snake, as long as they were separated from the snake by a distance of 12 ins. or more and that some kind of barrier existed between them and the snake.

Joslin, Fletcher and Emlen (1964) found no significant correlations between the subject's latency of reaching for a piece of food and the distance of the snake's head from the food.

It is difficult to draw any conclusion from the studies reviewed because of considerable methodological differences and the completely different criteria for fear established by the various researchers.

Movement of the snake. Yerkes and Yerkes' (1936) experiment, while lacking rigorous control of the movement variable, hinted at the importance of this independent variable in the primate's response to a stimulus object. It was found that chimpanzee infants feared a tortoise more than a glass snake, while adult subjects feared the glass snake more than the tortoise. Unfortunately the experimenters were not able to satisfactorily control the movement of the stimulus objects. On the whole, the tortoise was more active than the snake. To account for the infants' greater fear of the tortoise, it was suggested that they responded to the movement of the stimulus object rather than to its visual appearance. The authors stated that "had the two test objects been equally active, undoubtedly the

avoidance response to the snake would have been relatively greater than that obtained".

Haslerud (1938) specifically attempted to evaluate the role of movement in the elicitation of fear in chimpanzees. Animate and inanimate forms of the same stimulus object were presented to the subjects. When presented with a mounted garter snake and moving snake of the same size and species, the adult subjects' mean avoidance ratings to the mounted snake differed very little from the mean for all trials with the live snake. For adult subjects, the difference between the mean time for reaching for the food in the presence of the mounted snake and in the presence of the live snake was not statistically significant. In contrast, there was a significant difference between the childrens' mean reaching time for food and avoidance scores when presented with the mounted and the live snake. The lack of movement did not make the mounted snake less frightening to the adults. The adults seemed to respond to the potential as well as the immediately present properties of the snake.

McCulloch and Haslerud (1939) provided data on the responses of a single, laboratory-reared chimpanzee to a number of moving and stationary objects. The subject was tested at 7 months and then at 15 months of age. In the first test, avoidance was elicited by all the moving objects (live snake, live tortoise and live flame), but by none of the stationary objects, including a mounted snake. In the second test, avoidance responses were made to most of the test objects, both moving and stationary, with the exceptions of a shuttlecock, ball and the live snake. No explanation was offered for the live snake's failure to elicit fear in the second test. The authors had to be content with the conclusion that "at one stage in the history of our subject visual movement played the predominant role in eliciting responses".

Joslin, Fletcher and Emlen (1964) were not able to completely control

the live snake's movements during their experiment, but subjective evaluations were made of the extent of the snake's bodily movement. It was found that the correlations between the latency of the subjects' reaching response for food and the degree of the snake's movement were uniformly low and statistically non-significant.

The importance of movement and novelty for the eliciting of fear responses was stressed by Wolin, Ordy and Dillman (1963). Wolin et. al. pointed out that previous researchers had failed to recognize the complexity of movement and novelty as a stimulus characteristic, since movement apparently plays as much a role in the arousal of interest and curiosity as in the arousal of fear. This is illustrated by the work of Welker (1956) on the influence of novelty. He showed that novel objects often elicited timidity in chimpanzees. The opposite effect was also observed with novel objects eliciting play and exploratory behaviour. As the objects increased in familiarity to the subjects, both contact and withdrawal behaviour tended to decrease.

2.33. The Potency of the Snake as a Fear Stimulus

Primates' responses to a large range of stimulus objects, both animate and inanimate, have been studied to determine which objects are most feared.

Yerkes and Yerkes (1936) presented five test objects to each subject in the following order : A badminton shuttlecock; a rubber dog 18 cm. long and 9 cm. tall; a rubber tube 75 cm. long, which was chosen to simulate a snake in appearance and movement; a live gopher tortoise; and a live glass snake, 76 cm. long.

Infant, child, and adult chimpanzees were used as subjects. Each of the age groups approached the shuttlecock the most. The children and adults avoided the snake the most, while the infants showed the greatest avoidance to the tortoise. Yerkes and Yerkes (1936) proposed that the

infants avoided the tortoise more than the snake because of the tortoise's greater movement during the testing.

The data provided by Yerkes and Yerkes (1936) showed that for two of the three age groups, the glass snake was the most feared of the five objects. However, the absence of an adequate statistical analysis of the data excludes any statement on whether the snake was significantly more avoided than the other objects.

Haslerud (1938) presented both animate and inanimate stimulus objects to chimpanzees. The animate stimulus objects were a bouncing red ball, a kerosene lamp with a live flame, a live tortoise, a live alligator, and a live snake. The findings revealed wide individual differences in responses to particular test objects. There was a general tendency for the tortoise to be the most feared, the alligator and the snake somewhat less, fire still less, and the bouncing ball least.

Hebb (1946) presented a number of objects to 30 chimpanzee subjects. Of particular interest, to the topic under review, were the number of subjects responding with fear to the following objects : 4 subjects showed fear when presented with a mechanical toy grasshopper with moving legs; 8 showed fear to a toy turtle with moving legs; 5 showed fear to a rubber dog $3\frac{1}{2}$ ins. high; 8 subjects responded with fear to a coloured cloth dog 7 ins. high; and 21 of the 30 subjects responded with fear to a painted wax replica of a coiled, 24 ins. snake.

Masserman and Pechtel (1953) noted the reactions of vervet, spider and rhesus monkeys to a toy snake made of green rubber. When the toy snake was held outside the monkeys' cages for 10 - 30 secs., these animals responded with violent fear lasting for 15 - 30 mins. after which their behaviour returned to normal. Repeated trials produced similar reactions with the residual disturbances becoming progressively milder and shorter in duration. When presented with a toy rubber lizard,

a rubber spider and an undulating coiled steel spring, all the animals exhibited less intense responses, and within 30 mins. could tolerate these objects within their cages. In further tests, the monkeys showed no fear of various moving toys, largely ignored films of 300 animals or recordings of various animal vocalizations, and did not react with any fear to live dogs, cats, rabbits and rats.

Findings completely contrary to those of Masserman and Pechtel were presented by Wolin, Ordy and Dillman (1963). During testing, rhesus monkeys were presented with a toy cat, toy snake, live snake and live mouse. Under all presentations of the live snake no single instance of extreme emotional disturbance, indicative of intense fear, was observed. In fact, when summed over all subjects, all test stimuli and all test sessions, the frequency of approach responses was significantly greater than the frequency of avoidance responses. Some of the rhesus monkeys did show evidence of moderate arousal when the live snake was placed inside the subject's cage. However, this type of response also occurred with the introduction of the other test objects into the animals' cages. Throughout the testing period, the subjects did not exhibit any statistically significant differences in approach or avoidance to the stimulus objects. There was a slight but non-significant tendency for the monkeys to avoid the toy cat more than the other three objects.

Butler (1964) tested the reactions of rhesus monkeys to a number of stimulus objects by enclosing the subject in a box from which the subject could see the stimulus object by closely approaching one of two windows. Butler assumed that a view of a fear-provoking stimulus would suppress, or greatly decrease, further viewing behaviour. The view of live snakes, or another frightened monkey enclosed with live snakes, failed to suppress viewing behaviour. A similar result was found with the other stimulus objects.

It has been convincingly shown that primates in general do not have an unusually intense fear of snakes. A wide range of stimulus objects seem to be feared to an equal or even greater extent than snakes.

Kohler (1925) stated that anything that has "the phenomenological character of aggressiveness and 'awfulness', especially when there is the added factor of the surprising and unknown" is capable of producing fear.

Yerkes and Yerkes (1936) concluded that their data did not supply any evidence of specific fear responses "prior to or apart from individual experience with a given type of object". They suggested that the stimulus characteristics which are the most dominant in determining avoidance responses are : "visual movement, intensity, abruptness, suddenness and rapidity of change in stimulus or stimulus complex".

The consensus of opinion of recent researchers is summed up by Wolin, Ordy and Dillman (1963) : "the primates' fear of snakes is experiential rather than innate".

2.4. Concluding Remarks

The early studies on the fear of snakes in primates led several researchers to the conclusion that primates have an instictive fear of snakes. With the improvement in experimental design, findings emerged making the instinctive theory of the fear of snakes untenable. Experimental evidence is overwhelmingly in favour of the explanation of primates' fear of snakes in terms of individual experience and conditioning. Schiller (1952) maintained that the innate constituents of complex responses, such as fear, are not perceptual organizations but motor patterns.

The influence of a considerable number of independent variables on the fear of snakes in primates have not yet been investigated, e.g. the size, shape and colouration of the snake used as a stimulus. Welker (1956)

used test objects varying in size, colour and shape in his study of the effects of novel stimuli on play and exploratory behaviour in chimpanzees. These novel stimuli elicited an initial avoidance of contact, and, since the above qualities determined, at least to a certain extent, the novel character of the object, their relevance to avoidance and fear is apparent.

Up to the present time only behavioural measures of the fear of snakes in primates have been used. In view of the very low correlations between behavioural and autonomic measures of fear in humans (Lang, 1968), a different picture might emerge with the use of autonomic measures of fear in primates.

The implications of research in the field of the fear of snakes in primates are that further controlled investigations are essential to determine the specific stimulus qualities which have the greatest influence on the arousal of fear in primates.

Do the studies discussed in this chapter have any implications for the fear of snakes in humans? The possibility that man has inherited an innate fear of snakes from his "anthropoid ancestors" can definitely be discounted. However, the possibility that the independent variables, which have been shown to influence the fear of snakes in primates, are also of importance in humans' fear of snakes, merits thorough experimental investigation. Studies on the fear of snakes in primates have provided valuable guide-lines for research on humans.

3. THE FEAR OF SNAKES IN HUMANS

3.1. Introduction

In 1916 a number of letters were written to the editor of the journal Science, debating the origin of the fear of snakes in humans.

Dabney (1916) made reference to the general prevalence of an intense fear of snakes and snake-like forms "among the white race." He maintained that this abhorrence of snakes was a "deep-seated animal instinct" which had survived long after the conditions that gave rise to it. In the particular region of the U.S.A. in which Dabney lived, there was only one species of poisonous snakes yet he stated that :

> "Any intelligent person when unexpectedly brought into close proximity to any kind of snake, large or small, venomous or non-venomous, or even a semblance of a snake, is suddenly seized by a panic or horror and fear, with an impulse to spring away out of the serpent's reach as quickly as possible in a sort of blind terror." (Dabney, 1916, p.26).

Dabney reasoned that since the fear of snakes in man is practically universal, it must be instinctive. If instinctive it must survive from a period when the snake was a menace to the perpetuation of the human race. Such a period must have existed before man wore protective clothing. The main region in which man, at this stage of evolution would have had reason for fearing extinction by snakes is India. Therefore, India is the most likely cradle of at least the white race.

The views expressed by Dabney were soon challenged by McClellan (1916). He maintained that the fear of snakes is not instinctive at all, but the product of "erroneous education". False information is reinforced by a general timidity towards animals, resulting from the protected life characteristic of modern civilization. Mention was made

of the fact that many animals such as toads, lizards, spiders and worms are feared to the same extent as snakes. "And yet, none of the other creatures can at any time have menaced the existence of the human race."

McClellan stated that positive evidence against the instinctive theory is the absence in young children of any fear of snakes. Furthermore, McClellan claimed that he knew of a number of people who had never experienced a fear of snakes. This did not include those people whose fear had been eradicated by education, "but those in which the confidence born of natural curiosity has never been destroyed by positive fear instilled in early life".

Henderson (1916) also took issue with Dabney's point of view. Similar arguments to McClellan's were proposed. Henderson mentioned that mothers in some areas of the U.S.A. had found it necessary to teach their children to fear snakes in order to prevent them from playing with rattlesnakes. To show the absurdity of Dabney's theory of the origin of the instinctive fear of snakes, Henderson asked : "Does woman's proverbial fear of a mouse indicate an instinct engendered by ancestral residence in a region where such small animals were dangerous?" Henderson concluded that the evidence for an "instinctive horror of serpents" was far from satisfactory.

Support for Dabney's views was provided by Miller (1916) who maintained that the evidence was overwhelmingly in favour of the fear of snakes being a "vestigial instinct". Miller, a zoology teacher, often handled snakes but always felt a "shuddering dread of repugnance" of them. This, he claimed, is the normal attitude of humans towards snakes.

The fact that small children do not fear snakes, Miller maintained, does not disprove the instinctive nature of this fear. He stated that many instincts do not appear until their exercise is necessary for survival.

As the human is protected by the mother for a relatively long period, the exercise of the instinctive fear of snakes would be of no value.

Miller argued that the wide range of animals usually feared by humans does not detract from the "instinctive theory". Miller stated that "it is enough that there is some suggestive resemblance or association", to a snake to result in an animal being feared.

A heavy blow was dealt the theory of an instinctive fear of snakes by the work of J.B. Watson. Watson (1924) proposed that the human has only two innate fears : the fear of loud noises and the fear aroused by the sudden loss of support. From these two basic fears all other fears emerge. On the basis of his famous experiment on little Albert, Watson concluded that all fears of animals are conditioned and not innate. For example, Watson suggested that the fear of dogs proceeds from a traumatic experience in which the loud barking of a dog triggers the original fear of loud sounds. The theory as proposed by Watson has undergone modification, but the emphasis remains upon the learning, modification and extinction of fear through environmental experiences.

The psychoanalysts have interpreted the fear of snakes in an entirely different way. The feared snake is believed to be a symbol of a deep-seated or unconscious fear. Fenichel (1946), for instance, discusses symbolism as an archaic way of thinking. Adults may use a conscious idea as a symbol to hide an offensive unconscious idea. For example, the idea of penis may be objectionable and is, therefore, represented by a snake.

Hendrick (1934) believed that there is a universal tendency for people to use symbols to represent certain unconscious thoughts, especially sexual ones. One of the most frequently occurring symbols of the penis is the snake.

The obvious question which arises is why the snake should be a symbol

of the male genital organ. Brill (1949) admitted that, while there is little resemblance between the snake and the male genital organ to the "conscious eye", there is, nevertheless, a hidden, suggested similarity sufficient for the unconscious to draw the analogy.

According to Jung's early theories, the fear of snakes could be explained as an expression of the collective unconscious. Under more primitive conditions the snake was a very real enemy to man. This tribal fear is deeply implanted in modern man. As the child develops, he matures into succeeding phases of the "ontogenetic recapitulation" of the history of his race (Jung, 1956).

The studies discussed below are not directly concerned with testing the validity of the preceding theories. However, it is quite clear that the researchers in this field regard the fear of snakes in humans to be the result of learning and not instinct.

3.2. The Subjective Reports of the Fear of Snakes

Only one study could be found in the literature which is entirely devoted to an investigation of the fear of snakes. Many studies have been concerned with classifying all the fears mentioned by the subjects, and in some all subjects reporting a fear of one or more specific animals were simply classified in the broad category of "Fear of Animals". Statistical data on the fear of specific animals were frequently not provided.

The most frequently used method of studying the fear of snakes in humans has been the subjective report. A number of independent variables have been shown to influence the fear of snakes. It must be pointed out that several different methods have been employed to gather data. These differences must be borne in mind when comparing findings. A discussion of the merits of these methods can be found in Chapter 4, but for present purposes these methods will only be briefly described.

3.21. Methods of Gathering Data

Self-reports. Jersild and Holmes (1935), in the second part of their study entitled "Fears reported by children themselves and fears recalled from childhood by adults", presented data on the fears of 303 students and staff members from several colleges and universities. Each subject submitted a written, anonymous report of his childhood fears, his methods of coping with fear, and of fears persisting into adult life. Results were also used from an earlier study in which 400 children aged 5 - 12 years described their fears in response to questioning during private interviews.

Pratt (1945) obtained data on the fears of 570 children by requesting them to complete a survey sheet. The children were asked to write down all the things they were afraid of and then indicate the three things they most feared and the three things they least feared. Those children who were not sufficiently advanced in reading and writing to complete the survey sheet were interviewed individually.

The question posed the subjects in Wallis' (1954) study was somewhat different to that in Pratt's survey. In Wallis' study the subjects' school teacher asked them to write about "the thing that frightened me most when I was a little child". The children responded by describing a single experience rather than a list of items as elicited in Pratt's study.

Angelino, Dollins and Mech (1956) employed an "introspective-projective" technique to obtain information on children's fears. All the subjects were requested by their school teacher to "list the fears and worries you think persons of your own age-group have." All the reports were to remain anonymous and no attempt was made to interview the subjects or to structure the list of fears in any way. The expressed "fears and worries" of some 1100 children were classified into 10 broad categories.

A type of projective technique was also employed by Maurer (1956). After the completion of the WISC, the examiner asked each subject, "What are the things to be afraid of?" Each answer was recorded by the examiner as nearly verbatim as possible. The child was encouraged to mention his fears by the examiner giving a sympathetic nod to show the subject that his fears were quite reasonable and expected. When the child stopped speaking he was encouraged to proceed by the examiner saying, "And what else?" This was followed by "Anything else?" A few of the children said that there was nothing to be afraid of. In these cases the question was rephrased in a completely projective form : "Some children are afraid of something some of the time, aren't they?" The subjects agreed and the examiner continued : "What are these children sometimes afraid of?" This procedure produced "satisfactory replies" in all cases.

Morris and Morris (1965) were able to obtain data from an extremely large number of people by employing an ingenious method. A competition was set during a British children's T.V. programme and replies were obtained from 80,000 viewers. The children were asked to answer the following three questions : "Which animal do you like the most? Which animal do you dislike the most? Which animal topic would you like to see dealt with in future animal programmes on television?" A random sample of 11,960 replies were analyzed.

The competition was repeated in a British national newspaper with both adults and children entering. Those replying to the competition stated not only the animals they liked the most and those they liked the least, but also the reasons for their attitudes towards the animals concerned.

Since its construction by Akutagawa (1956), the Fear Survey Schedule (FSS) has been widely used, especially by behaviour therapists, in

evaluating the efficiency of systematic desensitization in the treatment of phobias. The FSS consists simply of a list of stimuli and situations to be rated by subjects in terms of the amount of fear or discomfort with which each is associated. Ratings on the FSS are made on a 5-point scale, ranging from "not at all" (scored zero) to "very much" (scored 4).

The FSS-II developed by Geer (1965) included the item "snakes" to be rated on a 7-point scale. Wolpe and Lang (1964) presented the FSS-III which included the item "Harmless snakes". Thse scales have been administered to non-clinical populations, thereby providing valuable data on the fear of snakes. Scherer and Nakamura (1968) constructed an FSS for children.

Russell (1967) compiled a list of common fears from the literature and interviews. The refined list consisted of 44 fear concepts appropriate to young subjects and 49 fears appropriate to older age levels. The fear concepts, including "Snakes", were individually combined with graphic rating scales. The rating scale ranged from 0 - 9, with 0 indicating "not fearful" and 9 indicating "extremely fearful". Adolescent subjects were asked to "rate the strength of each fear for you personally by making a stroke through the line at the place which best measures the strength of your fear". The instructions given to younger subjects were slightly simpler with "afraid" being substituted for "fearful" on the rating scale.

Reports by others on the subjects' fear of snakes. In the first part of Jersild and Holmes' (1935) study, parents submitted records of the fears exhibited by their children during a period of 21 days. The data included 153 records of the fears of infants and pre-school children. Reports were also submitted by 52 additional adults who kept occasional records of the fears shown by children under their care. In addition, 31 parents were interviewed by the experimenters concerning their children's

fears.

Lapouse and Monk (1959) interviewed the mothers of 482 children who were contacted by systematically selecting addresses from a telephone directory. The interview schedule was extremely long taking carefully trained interviewers 90 minutes to complete. The questions were designed to reveal not only the presence or absence of a particular fear, but, also where necessary, its frequency and intensity. The mother was chosen as the source of information for several reasons, two of which were the length of the interview and the detailed information requested.

3.22. Variables Influencing the Fear of Snakes

Studies of the fear of snakes based on subjective reports have revealed a number of independent variables, related to the subject, which influence this fear. No studies, using subjective reports, could be found in the literature which have attempted to assess the importance of stimulus variables on the fear of snakes, e.g. the size, colour, shape or movement of snakes. The lack of data on stimulus variables is the result of most studies, in this field, having a very wide focus, with the study of the fear of snakes constituting only a small part of the research.

Age. Agras and Oliveau (1969) attempted to estimate the prevalence of fears and phobias in the U.S.A. by interviewing a randomly selected sample of the general population. A detailed analysis of the prevalence and incidence of the fear of animals showed a slowly declining prevalence of these fears, suggesting that once acquired they are long-lived.

Jersild and Holmes (1935) found a distinct age trend in the percentages of children reported by their parents as having shown fear of some animal. The percentages of children classified as having shown a fear of "Animals" were as follows : 0 - 11 months, 25%; 12 - 23 months, 34.7%; 24 - 35 months, 40%; 36 - 47 months, 45.7%; 48 - 59 months, 40.9%;

60 - 97 months, 0%. The fear of animals became progressively more frequent up to the age of 4 years, with a slight drop at the age of 4 years, and then a decline after this age.

The following were the percentages of adults reporting the first appearance of a fear of "Animals" at various ages : 0 - 5 years, 21.5%; 6 - 10 years, 29.4%; over 10 years, 4.5% (Jersild and Holmes, 1935).

Pratt's (1945) investigation of the fears of rural children involved 570 subjects ranging in age from 4 years to 15 years, 10 months. The subjects were classified into 9 groups according to school grade, i.e. from kindergarten through to grade 8. The three most common fears mentioned were snakes, bears and bulls. From kindergarten to the 4th grade, bears were reported as being the most feared animal, with snakes second. However, from grades 5 - 8, snakes were the most feared. The percentages of children reporting a fear of snakes was as follows : Kindergarten, 10.5%; Grade 1, 8%; Grade 2, 8.5%; Grade 3, 7.5%; Grade 4, 7.5%; Grade 5, 8.5%; Grade 6, 7.5%; Grade 7, 8%; Grade 8, 7.5%. While there was a drop of 2.5% between kindergarten and Grade 1, the percentages remained virtually the same from grades 1 - 8. Pratt's study revealed a significant change in the percentages of children, reporting a fear of snakes, with an increase in age.

In the study by Angelino, Dollins and Mech (1956) only statistical data on the broad category "fear of animals" was provided, although they did mention that snakes were one of the most feared animals. The subjects were 1100 pupils ranging in age from 9 - 18 years. A clear-cut age trend was found. There was a rapid decrease in the average number of animal fears after the age of 10 years, and, by the age of 12 years, the number of animal fears reported was negligibly low.

Half of the 482 children in Lapouse and Monk's (1959) investigation fell into the 6 - 8 year old group and the other half were 9 - 12 years.

Data on the subjects' fears were gathered from their mothers. Between the age of 6 - 8 years, 16% of the children were reported as fearing at least one species of animal. On the other hand, only 7% of the children between 9 - 12 years were reported to have fears in the category "Animals". The difference between the percentages for the two age groups is statistically significant at or below the 5% level.

Of particular interest in Lapouse and Monks' research is the finding of no significant difference between the percentages of children fearing snakes in the two age groups. This finding is in agreement with Pratt's data, i.e. there is no significant decrease in the percentage of children fearing snakes, at least until the age of 12 - 15 years. Lapouse and Monk's findings suggest that the fear of snakes might be more persistent than other animal fears.

Morris and Morris (1965) found that the peak of snake hatred occurred at the age of 6 years. The dislike of snakes rose slightly from the age of 4 - 6 years and then began to decline gradually. At the age of 6 years, just over 30% of the children reported that they disliked the snake more than any other animal. By the age of 14 years, the percentage had fallen below 20%.

The children in Maurer's (1965) investigation named the snake as the most feared animal. The number of children reporting a fear of one or more animals decreased steadily from the age of 5 years to 12 years. However, the percentage showed a dramatic drop between the ages of 11 and 12 years and 13 and 14 years. The following are the percentages of children reporting a fear of one or other animal in the various age groups : 5 - 6 years, 80%; 7 - 8 years, 73%; 9 - 10 years, 61%; 11 - 12 years, 68%; 13 - 14 years, 23%. Data on the age trends in the fear of snakes were not provided.

Russell's (1967) study involved subjects at three age levels :

11 years, 17 years and "senior citizens". This is the only study which could be found in the literature utilizing a group of relatively old subjects (mean age of "senior citizen" was 69.6 years). The sample of "senior citizens" was drawn from various clubs and homes for the aged. While all the questionnaires completed by the 11- and 17-year old groups were satisfactory, only 45% of those obtained from the "senior citizens" could be included in the study. Many of these subjects had some physical disability which prevented them from satisfactorily completing the questionnaire. Some degree of caution is, therefore, necessary, in generalizing from these findings. The mean reported strength of the fear of snakes (possible range of scores 0 - 9) at the three age levels were : 11 years, 6.75; 17 years, 5.95; "senior citizen", 6.80. The differences between the mean ratings for the three age groups were not statistically significant.

In view of previous findings, Russell's (1967) results are extremely interesting, because of the notable absence of a significant decrease in the fear of snakes between the ages of 11 years and 17 years. These findings clearly contradict those of Morris and Morris (1965), while confirming the findings of researchers such as Lapouse and Monk (1959). From the work of Lapouse and Monk (1959) there appears to be a difference between the age trend of the fear of snakes and the fear of certain other animals, i.e. the fear of snakes might be more persistent than the fear of other animals. This would account for the discrepancy between Russell's findings and those of studies providing data on the number of children reporting fears in the general category "Animals", e.g. Maurer (1965) and Angelino, Dollins and Mech (1956).

Mental Age. Jersild and Holmes (1935) classified the animal fears reported by their subjects into the fear of "remote animals", i.e. animals not likely to be encountered by the child in his environment, such as

lions, tigers and snakes, and the fear of animals excluding "remote animals". This latter category included animals likely to be encountered by the child, e.g. dogs, cats and insects.

Subjects were classified into three groups according to their I.Q. levels. The percentages of children reporting a fear of one or more non-remote animals were as follows : I.Q. 120 and above, 6%; I.Q. 100 - 119, 9%; I.Q. 80 - 99, 9.7%. The percentages of children reporting a fear of one or more remote animals were : I.Q. 120 and above, 8.3%; I.Q. 110 - 119, 11.1%; I.Q. 80 - 99, 7%. Jersild and Holmes did not state whether the differences between the percentages for the groups were statistically significant or not.

Maurer (1965) evaluated the replies of her subjects on the basis of mental age. The subjects included 18 mentally retarded children. The fear of one or more animals maintained a high percentage level through ages 5 - 12 years, but only one of the nine children with a mental age of 13 years or more admitted to fearing an animal. Because of the small number of subjects in the most mature group, it is difficult to determine whether there is in fact a significant decrease in the fear of animals with the attainment of a mental age of 13 years or more. A high I.Q. did not seem to predispose the child to make realistic assessments of the dangers confronting him. Children with high I.Qs. appeared just as likely to mention "snakes, lions and tigers" as the things to be afraid of, as children with low I.Qs.

More thorough investigations are required before the importance of the independent variable of mental age in the fear of snakes can be determined.

Sex-linked fear. Jersild and Holmes (1935) found only a small difference between the mean number of fears of boys and girls as reported by their parents. The following were the percentages of boys and girls,

respectively, who were reported to fear one or more animals at various ages : 0 - 97 months, 14.9% and 15.6%; 0 - 23 months, 9.2% and 3.4%; 24 - 47 months, 20% and 18.3%; 48 - 71 months, 10.5% and 27.1%. Generally the percentages for girls are higher than the percentages for boys. Information on the statistical significance of the differences was not presented.

Jersild and Holmes (1935) also provided the percentages of boys and girls giving a self-report of their fears of animals. "Remote animals" were feared by 11.2% of the boys and 7.5% of the girls. Of the children admitting a fear of one or more non-remote animals, 9% of the boys and 7.5% of the girls mentioned such fears.

Pratt (1945), in his study of the fears of rural children, found that girls generally reported more fears than boys. However, the mean percentage of boys and girls reporting a fear of snakes was 10.5% and 9.1% respectively. This difference is probably not statistically significant.

Using an "introspective-projective" technique, Angelino, Dollins and Mech (1956) found that boys, when asked to list the fears and worries they thought persons of their own age had, most frequently mentioned snakes, then dogs and insects, as the animals most feared. Girls, from a lower socio-economic group, listed dogs ahead of snakes. Upper socio-economic girls named insects and dogs ahead of snakes. While the boys clearly rated the snake as the most feared animal, girls considered dogs more feared than snakes and, in some cases, dogs and insects as being more feared than snakes.

Lapouse and Monk (1959) asked mothers to report on their children's fear of snakes. Of the 241 male children in the sample, 25% were reported to fear snakes. The corresponding percentage of the 241 female children was 61%. The difference in percentages is significant at the

5 per cent level.

Maurer (1965) posed his subjects the question, "What are the things to be afraid of?" In the category of animal fears the snake was most frequently mentioned. The snake was named by 28% of the boys and 33% of the girls. Maurer did not state whether this difference is statistically significant or not.

Very similar findings to those of Maurer (1965) were reported by Morris and Morris (1965). Using a much larger sample than Maurer, but with subjects falling within virtually the same age range, Morris and Morris reported that 24% of the boys and 30% of the girls stated that they disliked the snake more than any other animal. The ratio of boys and girls hating the snake remained more or less constant between the ages of 4 years to 14 years.

Geer (1965) administered the Fear Survey Schedule (FSS) II to 783 first-year psychology students in the U.S.A. The mean total score for men was 75.78 (maximum possible score being 357), and the mean total score for women was 100.16. The difference between these means is highly significant, indicating that women report more intense fears than men. Of particular interest is the finding that women gave snakes a significantly higher fear rating than did the male subjects. The mean score for men on the item "snakes" was 1.97 (possible maximum score being 9), while the women's mean score was 3.05. The sex difference on the fear rating of snakes was significant beyond that expected on the basis of the sex difference between the total scores. Geer was unable to provide an explanation for the sex-linked differences. He did, however, suggest that cultural differences might have accounted for the results in that women are allowed to show fear, while men are not.

Hannah, Storm and Caird (1965) administered the FSS-III to a large sample of Canadian undergraduate psychology students. It was found that the proportion of female subjects reporting extreme fear of the "more

clearly phobic items" was substantially greater than the proportion of male subjects reporting such fears. While only 3% of the males reported having an extreme fear of snakes, almost 20% of the females did so. A number of possible explanations for these sex differences were proposed by Hannah et. al. The sex differences might reflect a temperamental difference, genetic in origin, between males' and females' susceptibility to fear. On the other hand, environmental pressures, varying in intensity for males and females, might induce males to suppress and control their fears, while permitting the expression of fear in females. Another possible explanation is that females are more willing to admit fear than males. Furthermore, the possibility cannot be discounted that the sex difference in the rating of the fear of snakes did not in fact reflect any genuine sex difference in emotional response.

Bernstein and Allen (1969) administered the FSS-II to 946 males and 868 females in an introductory psychology class of an American university. The mean rating of the fear of snakes was 3.07 for males and 4.02 for females. The difference is statistically significant at the 1 per cent level.

A FSS for children was constructed by Scherer and Nakamura (1968). When it was administered to a sample of 10-year old children, it was found that the total number of fears reported by girls was significantly higher than the number reported by boys. Girls also rated their fears as being more intense than the fears rated by boys. Separate data on the fear of snakes were not provided.

Using a graphic rating scale ranging from 0 ("not fearful") to 9 ("extremely fearful") Russell (1967) found significant sex differences in each of the three groups in response to the item "snakes". The mean ratings of the fear of snakes by females in the 11 year, 17 year and "senior citizen" age groups was 8.6, 7.0, and 7.8, respectively. On the

other hand, the mean ratings for the males were 4.9, 4.9, and 5.8 for the three respective age groups. It is interesting to note that the mean ratings obtained by Russell (1967) are a great deal higher than those obtained by Geer (1965) from a student sample. These differences could possibly be accounted for by the variables of age or mental age.

In each of the studies using a graphic rating scale, females reported a significantly more intense fear of snakes than males. The origin of this difference is unknown. The differences between the number of males and females reporting a fear of snakes was small and probably not statistically significant in those studies requiring subjects merely to list their fears without gathering information on the intensity of the fears.

Socio-economic status. Several of the earlier studies indicated that children from different socio-economic groups have different fears. Jersild, Markey and Jersild (1933) investigated the fears of approximately 400 children, varying in age from 5 - 12 years, from two different schools in New York. One group attended a public school and came from "relatively poor homes", while the other group attended a private school and came from "relatively well-to-do and cultured" families. The children from the lower socio-economic group reported more fears of animals than did the children from the higher socio-economic group.

Jersild and Holmes (1935) found no significant differences in the fears of children, below the age of 6 years, from a high and a low socio-economic group. However, children 6 - 12 years of age in the higher socio-economic group reported more fears of the possibility of danger (e.g. falling or drowning) than did the children from the lower socio-economic group who seemed to fear "remote animals", such as snakes, lions and tigers, more than realistic dangers encountered in everyday life.

Davidson (1950) asked his subjects, "Of what are you most afraid?"

The subjects were 102 children, aged 9 - 14 years, from diverse socio-economic groups. Davidson maintained that while fears appear in all groups of children, the type of thing feared is often different in low and high socio-economic groups (Macfarlane, Allen and Honzik, 1954).

Angelino, Dollins and Mech (1956) sampled two broad classes in terms of socio-economic background. All the subjects were classified as being either from a high or a low socio-economic background. The mean of the fear of animals reported by pupils of the upper socio-economic group was 0.21, while the mean for the lower socio-economic group was 0.58. (These means were calculated by dividing the total number of fears of animals by the number of subjects in each group). Boys most frequently mentioned snakes, dogs and insects as the most feared animals. Girls from the lower socio-economic group most frequently listed dogs, snakes and insects, respectively, in order of fearfulness. Upper socio-economic girls named insects and dogs ahead of snakes. Angelino et. al. concluded that socio-economic background is an important variable in the self-expressed fears of different social groups.

Half of the children in Lapouse and Monk's (1959) study were drawn from an upper socio-economic group, while the other half came from a lower socio-economic group. No significant difference was found between the number of children, in the two groups, reported to fear snakes by their mothers. Furthermore, there was no significant difference between the two groups in the total number of animal fears.

The data provided by those studies based on the reports of fears by the children themselves consistently show that lower socio-economic subjects have more fears of animals than upper socio-economic subjects. Lapouse and Monk's (1959) findings clearly contradict those of earlier studies. It should be noted that Lapouse and Monk gathered their data from subjects' mothers. This methodological difference could account for

Lapouse and Monk's (1959) contradictory findings.

Rural or urban environment. Pratt (1945) studied the fears of rural children varying in age from 4 - 15 years. Pratt attempted to compare his findings with those of Jersild, Markey and Jersild (1933) on urban children. This was made difficult by the fundamental difference in the analysis of the data in the two studies. While Pratt presented data on the fear of each specific animal mentioned by the subjects, Jersild et. al. recorded the fear of specific animals under the general heading of "Fear of Animals". In addition, if a child reported fearing several animals, Jersild et. al. entered only one tally in the category of "Fear of Animals". This method led to a distorted picture of the fear of animals.

Of the urban children used in Jersild et. al's. study, 25% reported a fear of animals. While no directly comparable value for the rural children in Pratt's study was available, by making a rough approximation it was calculated that 69% of the rural children reported fearing "animals". Pratt stated that while rural children probably have more contact with animals, a large percentage reported a fear of animals not found in the region or animals which presented no real danger. This indicated that these fears had a cultural origin.

Wallis (1954) studied the fears of two groups of Dakota Indian children living in rural areas. Of the Canadian Dakota Indian children, 8 - 14 years of age, 45% reported a fear of animals. The percentage of Minnesota Dakota Indian children, 6 - 14 years of age, reporting a fear of animals, was 50%.

Wallis compared her findings with those of Jersild and Holmes (1935). Jersild and Holmes used three different methods to gather data on the fear of animals in urban children. Depending on the method employed the percentages ranged from 13.5% to 18.8%. These values are considerably

lower than those obtained by Wallis.

No study could be found in the literature which specifically attempted to investigate the influence of rural or urban environment on the fear of snakes. The comparison of findings mentioned in this section are of dubious value for several reasons. The vast differences in the collecting and analyzing of data make comparisons between studies hazardous. Furthermore, it is doubtful whether data on differences in the fear of animals (a broad category including all animal fears), as reported by Pratt (1945) and Wallis (1954), accurately reflects differences in the fear of snakes. Lapouse and Monk's (1959) findings have already been mentioned showing that while the fear of "animals" decreased significantly between the ages of 6 - 12 years, the fear of snakes did not follow this trend. There might be a qualitative difference between the fear of snakes and the fear of certain other animals.

Culture. A comparison of the findings of Pratt (1945) on the fears of White, rural American children and the findings of Wallis (1954) on the fears of Dakota Indian children living in rural areas, throws light on the possible influence of the variable of culture. The respective percentages of children reporting a fear of one or more animals in Pratt's and Wallis' investigations were 69% and 45% - 50%. Of greater interest was the finding that the children in the two race groups reported fears of different types of animals. While the Dakota Indian children predominantly reported fears of domestic animals, the children in Pratt's study mentioned the following animals most frequently : bears, snakes, dogs, bulls, lions, tigers and elephants. Only one "pseudo-exotic" animal was mentioned by an Indian child and that was a large snake which had actually been seen at a fair in one of the surrounding villages. The children in Pratt's study tended to report fears of animals not found in their environment, while the Dakota Indian children's fears were more

realistic, focussing on domestic animals.

Lapouse and Monk (1959) found a significant difference between the percentage of American Negro children (59%) reported to fear snakes and the percentage of White children (41%) reported as having this fear.

Antecedents of the fear of snakes. There has been a marked absence of attempts to ascertain the effects of differences in individual experience on the subject's fear of snakes. Bandura, Blanchard and Ritter (1969) performed an experiment on the efficacy of desensitization and modeling on snake-phobic subjects. A questionnaire was administered to the subjects at the beginning of the experiment. This questionnaire was designed to measure : (1) the subject's personal aversive experiences with snakes; (2) vicarious aversive experiences with snakes; and (3) whether the subject's family members had exhibited snake phobia behaviour ("familial modeling").

Bandura et. al. found that, although none of the subjects had ever been physically injured by a snake, they reported various aversive experiences involving snakes. As children, many of the subjects (68%) reported having been frightened by surprise encounters with snakes on hikes, coiled up under rocks, in tents, and in other unexpected places. A number of subjects had seen snakes being beaten to death. Bandura et. al. suggested that, to a young child, incidents of this type would have conveyed the impression that snakes must be extremely dangerous to receive such treatment.

In 62% of snake-phobic cases, some sort of trick had been played on the subjects by frightening them with a toy or rubber snake. As these tricks were usually played on those children who were already apprehensive about snakes, this would have reinforced their fear.

Over half of the subjects (58%) reported having experienced recurrent nightmares caused by unpleasant vicarious experiences involving

snakes. Subjects found particularly disturbing those scenes in films or television programmes showing snakes stalking their prey, moving menacingly towards unsuspecting people, or large constrictors crushing people or animals to death.

An early study by Hagman (1932) yielded a correlation of 0.667 between the gross number of children's fears and the gross number of mother's fears. Jersild and Holmes (1935) found "a good deal of correspondence between the frequency of fears of children of the same family"; the correlations ranged from 0.65 to 0.74. May (1950) suggested that the child tends to learn to fear certain things because the parents fear those things. Bandura et. al. reported that 56% of their subjects had observed snake phobic behaviour being exhibited by one or other of their family members.

The vast majority of the subjects in Bandura et. al.'s research had undergone two or more of these types of aversive experiences involving snakes, i.e. direct, vicarious or "familial modeling". These findings should be interpreted with caution because of the absence of data from a non-phobic sample. Bandura et. al's. data do indicate, nevertheless, that the snake-phobic subjects in their study had undergone "numerous frightening experiences capable of endowing snakes with strong aversive properties".

3.23. The Fear of Snakes in Relation to the Fear of Other Animals

The question of whether snakes are feared to a greater or lesser extent than other animals has received attention in several of the studies based on the subjective report of fears.

Pratt (1945) found that the following animals were reported as being the most feared (in descending order) : bears, snakes, dogs, bulls, lions, tigers, wolves, elephants and horses. Of the total number of fears reported, the fear of bears accounted for approximately 8%; snakes

8%; dogs, 4.25%; bulls, 4%; and lions, 3.5%.

A relatively high percentage (50%) of Dakota Indian children subjects living in Minnesota were found by Wallis (1954) to report a fear of one or more animals. Of the animal fears mentioned, 38% were of snakes while the remaining 62% were of large domestic animals and poultry.

Lapouse and Monk (1959) found that 44% of the mothers interviewed claimed that their children feared snakes. The percentage of mothers claiming that this was a generalized fear of animals was 12%.

When a large number of children in Britain were asked to name their most hated animal by Morris and Morris (1965), 27% named the snake, 9% the spider, 4.5% the crocodile, 4% the lion, 4% the rat, 2.75% the skunk, 2.5% the gorilla, 2% the rhinoceros, 1.75% the hippopotamus, and 1.75% the tiger. It was quite apparent that the snake was disliked significantly more than any other animal.

Maurer (1965) reported a distinct tendency for children between the ages of 6 - 12 years to name one or other animal in response to the question, "What are the things to be afraid of?" The snake was mentioned more often than any other animal. Thirty-three of the subjects mentioned snakes, 28 named lions, 14 named tigers and 9 named bears.

Of the "animal items" included by Geer (1965) in the FSS-II to be rated by subjects, the mean fear rating for snakes was clearly the highest (2.51), followed by "stinging insects" (2.09), "spiders" (1.69), "rats and mice" (1.68), "strange dogs" (1.62), and "worms" (0.79).

Bernstein and Allen (1969) administered the FSS-II to a large sample of male and female college students in the U.S.A. and obtained very similar results to those of Geer (1965). Snakes received a significantly higher mean combined rating than any of the other animals included in the scale.

Russell (1967) reported that of the animals rated by subjects the snake received the highest fear rating. The mean rating for snakes across all age groups and for both sexes was approximately 6.75 (maximum possible score being 9). The fear ratings for other animals were as follows : Rats, 4.40; spiders, 4.20; lizards, 3.11; and dogs, 2.47.

When comparing the type of animal feared by American and British children of the same age, striking differences become apparent. Several of the 10 most feared animals mentioned by American children seemed to be hardly mentioned by British children. For example, bears and dogs are apparently two of the most feared animals by American children, but are feared by only a very small percentage of British children. However, the snake appears to be, if not the most feared animal, one of the three most feared animals by both British and American children.

3.3. Behavioural Studies of the Fear of Snakes

The studies reviewed in the preceding section were based on the subjective report of fear. The two studies to be reviewed in this section are based on the observations by an experimenter of the behaviour of subjects in the presence of a live snake.

The best known study of the fear of snakes is undoubtedly that of Jones and Jones (1928). The experimental situation, for the younger subjects, consisted of a play-pen, 8 ft. by 10 ft., built on a nursery floor. A number of toys were placed inside the pen, and at the one end two black suitcases were positioned. The suitcases, which could easily be opened by a child, contained a mechanical toy in the one, while the other contained a harmless snake about 6 ft. in length and about 4 ins. in circumference at the middle of the body. When free in the pen, the snake moved around actively. If the child did not open the suitcase

containing the snake, an experimenter was able to do so, from a concealed position behind a screen, by pulling a string attached to the lid of the suitcase. Detailed observations of the child's behaviour were made upon release of the snake.

The youngest group of children tested varied in age from 1 year 2 months to 6 years 7 months. All the children used in the experiment came from urban areas and had never seen a live snake previous to the testing. Of the 15 children in the youngest group, seven showed a complete absence of any fear in the presence of the active snake. These children ranged in age from 14 - 27 months with a mean age of 20 months. Eight of the children exhibited "guarded reactions" in the presence of the snake, two of these revealing distinct fear, while another two showed "marked avertive responses" when the snake tended to become aggressive. The remaining four subjects were classified as "unafraid but wary". The ages of the "guarded" group ranged from 26 - 79 months, with a mean age of 44 months. Only one child under 3 years showed any sign of fear in the presence of the snake. However, when this child was presented with the snake on the following day, no fear was shown.

A group of 36 older children, ranging in age from 6 - 10 years, was also tested. Nine of the subjects exhibited "definitely resistive behaviour" and these were mainly the older boys in the group. Only four of the children refused to touch the snake.

In a further experiment the snake used in the above experiments or a smaller boa constrictor was presented to about 90 graduate or undergraduate students. The snake was introduced as "a perfectly harmless animal; the skin of the reptile has a smooth and pleasant feeling, and we guarantee that in touching him no one runs the slightest risk". Approximately one-third of the subjects refused to have the snake brought near them. One-third of the subjects touched the snake "with obvious

hesitation and dislike". The remaining one-third (including the same number of males and females) reached forward and touched the snake without any apparent emotional disturbance. A number of subjects, both males and females, exhibited strong phobic behaviour and would not remain in the room in which the testing was conducted.

The age trend in Jones and Jones' study can be summarized as follows : No children under the age of 2 years showed any fear at all of the snake. By the age of $3\frac{1}{2}$ years cautious reactions towards the snake were common. Definite fear behaviour occurred more often after the age of 4 years, and was more pronounced in adults than in children. No sex differences were observed at any age.

Jones and Jones gathered data on the type of stimuli most feared by pre-school children. The reactions of children towards flashlights, darkness, false-faces, snakes, rabbits, frogs and several other stimuli were recorded. It was found that the animal which most often aroused fear was the frog. However, fear was not aroused by the mere sight of the frog, but usually when it jumped suddenly. A species of beetle which jumped up suddenly when placed on its back was fairly effective in arousing fear. Caterpillars and earthworms, on the other hand, only aroused mild curiosity in the younger children. From these findings, Jones and Jones concluded that :

> "Children tend to be afraid of things that require them to make a sudden and unexpected adjustment. Stimuli which are startlingly strange, which are presented without due preparation, or which are painful or excessively intense, belong in this category" (Jones and Jones, 1928, p. 137).

A number of recommendations for future research were made by Jones and Jones. One of these was that observational data should be confirmed by the use of GSR measures. This was advocated because some of the adult

subjects would willingly stroke a snake in an apparently composed way, while their faces and palms were covered with beads of sweat, indicating a marked degree of emotional tension. This attempted repression of fear was seldom observed in children.

Holmes (1935) conducted an experimental behavioural study of the fears of young children. The subjects were 105 children consisting of 57 boys and 48 girls, with an age range of 24 - 71 months. Over half of these children came from a private nursery school, while the remainder came from a day nursery school. The parents of the former children were of a "relatively high socio-economic status", while the latter came from "relatively poor homes". The average I.Q. of the children from the private nursery school was 121.5, while the average I.Q. of the day nursery school children was 105.8.

A live snake approximately 2 ft. in length was placed in a box together with a toy. The experimenter invited the child to look into the box and reach for the toy. If the child was reluctant to touch the toy, the experimenter would stroke the snake and remove the toy. The child was then urged to do the same. The experimenter ensured that the snake was active throughout testing. A check-list of possible behaviours in the experimental situation was compiled. The subject's behaviour was scored by marking the appropriate items on the check-list.

The percentage of subjects showing fear of the snake at various ages was as follows : 24 - 35 months, 34.8%; 36 - 47 months, 55.6%; 48 - 59 months, 42.9%; 60 - 71 months, 30.8%. It is interesting to note that at the age of 60 - 71 months the snake was the only animal which elicited any fear in the experimental situation. While a large dog was feared by approximately the same number of children in the first three age groups, none of the children in the 60 - 71 month group showed any fear of the dog.

To determine the possible influence of intelligence on fear, the fear behaviour of the 20 children with the highest I.Qs. (128 - 150) was compared with the fear behaviour of the 20 children with the lowest I.Qs. (82 - 116). The children with the higher I.Qs. showed slightly more fear of the snake than the children with the lower I.Qs. The difference was not statistically significant.

More girls showed fear of the snake than boys, the percentage being 50% and 40%, respectively. These sex differences were found between the age of 24 - 59 months. Between the age of 60 - 71 months, 50% of the boys showed fear of the snake, while only 20% of the girls showed fear of the snake. It must be pointed out that there was only a small number of subjects in the 60 - 71 month group; 4 boys and 10 girls.

3.4. The GSR as a Measure of the Fear of Snakes

Wilson (1966) chose the galvanic skin response (GSR) as a physiological measure of the fear response because "it is known to be representative of the common autonomic indices as well as CNS measures of arousal".

Wilson's experiment was conducted in a dark booth where the subject sat facing a screen. Coloured slides were tachistoscopically projected on to the screen for a period of one second, with 15 sec. intervals between slides. Skin resistance was continuously monitored.

A group of 32 "apparently normal" subjects, 16 males and 16 females, aged 16 - 23 years, were tested using three stimulus categories : landscapes, snakes and spiders. The slides were presented in rotating order, beginning and ending the test with a landscape. Eight slides of landscapes were used, the response to the first one not being measured. There were seven slides of spiders and seven of snakes.

The criterion used in scoring the magnitude of the GSR was the maximum decrease in resistance from the time of stimulus presentation until either 10 secs. had elapsed, or any 4 sec. period in which no net decrease

in resistance took place.

There were no significant differences between GSR scores of males and females for any of the three stimulus categories. Furthermore, the mean GSR scores for the three stimulus categories did not differ significantly. Of particular interest was the finding, in a further experiment, that although snakes, tigers and rats were rated by some subjects as "very disturbing", pictures of them produced no measurable GSRs. However, when a woman who was cat-phobic was given four trials using a set of 12 different animal pictures including a white domestic cat, the GSR to the cat was significantly greater than that produced by any other picture.

With Wilson's (1966) technique, only pictures of phobic animals evoked measurable GSR's. This technique appears capable of distinguishing between phobias and "rational-adaptive" fears, but not between the absence or presence of rational or adaptive fears. This technique would appear to be unsuitable for a study of the fear of snakes in a non-phobic sample.

3.5. Concluding Remarks

From this review of the literature on the fear of snakes in humans, it is obvious that research has hardly begun to throw light on the independent variables influencing this fear. The data on the effects of the independent variables mentioned is contradictory in virtually every instance. In several cases the studies reviewed only have an oblique bearing on the fear of snakes. At this stage of research conclusions are hazardous.

When taking all the studies reviewed in the chapter into account only the variable of age has consistently been shown to influence the fear of snakes. The evidence is, however, completely contradictory as to whether the fear of snakes increases or decreases in prevalence and intensity with

an increase in age. The most apparent need is for additional studies using behavioural and autonomic measures of fear.

Two important points emerge from the research on the fear of snakes in humans. Firstly, while little light has been thrown on the etiology of the fear of snakes, there appears to be a strong suggestion that the fear of snakes is ubiquitous. Secondly, the fear of snakes is very often irrational and, therefore, it is not surprising that people still tend to regard this fear as innate.

4. DESIGN OF THE EXPERIMENT

4.1. Aims of the Experiment

1. To determine whether there are differences between Xhosas and Whites in the fear of snakes.
2. To determine the influence of age of the subjects on the fear of snakes.
3. To obtain a measure of each subject's aversive experiences of snakes and his attitudes towards snakes.
4. To determine the relationship between a behavioural and a physiological measure of the fear of snakes.
5. To determine whether there is a significant relationship between a subject's previous aversive experiences of snakes and the intensity of his fear of snakes in the experimental situation.
6. To determine whether there is a significant relationship between a subject's attitudes towards snakes and the intensity of his fear of snakes in the experimental situation.
7. To attempt to synthesize the findings towards an explanation and comments on the etiology of the fear of snakes.

4.2. Subjects

The 200 subjects used in this study were selected with the view to determining the influence of culture and age on the fear of snakes.

Only male subjects were used for a number of reasons. Studies using behavioural or physiological measures of the fear of snakes found no significant differences between the responses of males and females to snakes (Jones and Jones, 1928; Wilson, 1966). Furthermore, the data provided by self-report measures of the fear of snakes, showing a significantly greater fear of snakes in females than males, can probably be

accounted for in terms of biasing factors such as social desirability (Wilson, 1967a). Ethical considerations and the necessity of keeping the size of the sample within reasonable bounds also contributed to the decision not to include female subjects in this study.

4.21. The Two Cultural Groups

Xhosa and White subjects were used. There are distinct cultural differences between these two groups. Furthermore, there is evidence that the snake has assumed different roles in Xhosa and White culture. This can be expected to predispose Xhosas and Whites to react to snakes in different ways. The testing of Xhosas' and Whites' reactions to a snake was intended to provide objective evidence of the presence or absence of different intensities of response to a snake. The group of subjects tested consisted of 100 Xhosa and 100 White subjects.

It is a widely held belief in South Africa that Whites have negative attitudes towards snakes (Isemonger, undated). Even in Britain, where there is virtually no chance of being harmed by a snake, the danger of snakes has been grossly exaggerated (Morris and Morris, 1965). In the Christian tradition the serpent was responsible for introducing evil into the world and the snake has inevitably been associated with evil, cunning and deception (Fitzsimons, 1962).

In Western literature many stories involving man's unpleasant experiences with mythical dragons and sea-serpents can be found. There are also numerous accounts in newspapers and books of men encountering snakes of impossible proportions. Until fairly recently Whites have waged what amounts to an anti-snake propaganda campaign. The snake has been consistently presented in a more unfavourable light than probably any other animal.

A morbid interest in snakes appears to be fairly widespread among Whites in South Africa, e.g. the large volume of visitors to snake parks.

The predominant reaction of visitors to the handling of snakes in one such snake park is revulsion.[1] Magazines and newspapers in South Africa publish stories of man versus snake fairly regularly.

While there is no objective, statistical evidence to support this view, it can be tentatively predicted that the vast majority of South African Whites view the snake in an unfavourable light.

In traditional Xhosa culture the snake plays an important role in the following two spheres : witchcraft and ancestor-worship. There is also an indication that certain snakes might be associated with successful childbirth.

Xhosas believe that the snake is one of the most important familiars of a witch. The inyoka yabafazi (The "snake of women") is sent by witches to bite their victims who then develop some sort of illness depending on where they are bitten (Hoernle, 1937). This belief is not restricted to rural Xhosa. Mayer (1963) stated that urban Xhosas believe that the inyoka yabafazi can be transported into the township by a young utikoloshe (a mischievous watersprite). Failing this the witch may use an innocent human agent to carry the inyoka yabafazi into town. The familiar's appearance changes into that of some valuable object, e.g. a ring or coin. Someone innocently picks it up and when it gets near it's intended victim it disappears "as if he had dropped it out of his pocket". After completing its evil deed the inyoka yabafazi gets itself returned to the witch by similar means.

Hoernle (1937) stated that the Cape Nguni fear a snake called the ichanti. This is a snake living in rivers and which is capable of metamorphosis, appearing in any form. Anyone who sees it becomes ill and will

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[1]Personal communication from N. Schafer, herpetologist at the Port Elizabeth Snake Park.

die unless treated by a wizard.

The Xhosa believe that their ancestors manifest themselves to the living in two main ways : dreams and snakes (Petterson, 1953). Eiselin and Schapera (1937) stated that these spirit snakes belong to certain well-known species, usually harmless.

Among the Pondo (a Xhosa-speaking tribe) the various clans regard a particular species of snake as being a manifestation of their ithongo (ancestor spirit) and treat it with great respect. Snakes which are not the ithongo of the particular clan are killed. The "clan snakes" living in the kraals are non-poisonous and are believed to "make the cattle rich". However, these snakes may also cause sickness when they are introduced into another umzi (household) with purchased cattle or with a girl who has come as a wife. "It is because that ithongo was cared for in the umzi from which it came, and in the strange umzi it was not cared for" (Hunter, 1936).

Sundkler (1961) claimed that the Zulu attribute to the snake the functions of fecundity and childbirth. The Pondo associate their clan snake with successful childbirth. When a clan snake enters a hut and coils up near a pregnant woman it means that she will survive labour and the child will be born healthy (Hunter, 1936).

Fitzsimons (1962) stated that Africans are extremely superstitious about snakes. It appears to be popular belief among Whites that Xhosas are considerably more afraid of snakes. The Experimenter has had numerous stories recounted to him by Whites of Xhosas showing extreme fear at the mere sight of a snake. What is clear is that the snake plays a role of far greater importance in Xhosa culture than in White culture in South Africa. How this influences a subject's reactions to a snake is one of the questions this experiment will attempt to answer.

4.22. The Age-Group

Five age-groups consisting of 40 subjects (20 Xhosas and 20 Whites) each were included in the study. The age-groups were as follows : 6 - 7 years, 9 - 11 years, 14 - 15 years, 18 - 20 years, and over 25 years. All the subjects except for the White 14 - 15 years group had lived in an urban area from birth and had not, on any single occasion spent more than one month in a rural area.

Group 1 (6 - 7 years). The White and Xhosa boys attended local schools. The White boys' parents, with few exceptions, belonged to a low socio-economic group. Several of the boys lived in homes bordering on an African township. Nine of the boys were English-speaking and 11 were Afrikaans-speaking.

The vast majority of the Xhosa boys came from typically poor families. This was quite evident from their inadequate winter clothing.

All the Xhosa boys were in their first year of schooling, while the White boys were in their first or second year of schooling. This age group was considered to be the youngest that could effectively be used in the procedure of this experiment.

Morris and Morris (1965) found that the dislike of snakes reached a peak at the age of 6 years and then began to decline. It was decided to include a 6 - 7 year group in the present experiment to provide data which could be compared with Morris and Morris' findings on British children.

Group 2 (9 - 11 years). The subjects in this group were drawn from the same schools as the 6 - 7 year group. The socio-economic status of the subjects appeared to be very much the same as the Xhosa and White subjects in the preceding group. Of the White subjects, 12 were Afrikaans-speaking and eight were English-speaking. The Xhosa and White subjects were either in their third or fourth year of schooling.

McFarlane, Allen and Honzik (1954) reported that the fear of specific objects reaches a peak at 3 years and again at 11 years. However, the findings of several other studies (e.g. Morris and Morris, 1965) would predict a decrease in the fear of snakes at this age as compared to the 6 - 7 year group.

Group 3 (14 - 15 years). In the White group, 10 of the subjects came from an urban area, while the other 10 had lived on a farm for at least three years. Although the number of "rural" and "urban" subjects was small, a comparison of results could throw light on the possible influence of urban or rural environment on the fear of snakes.

The discrepancy between the socio-economic status of White and Xhosa subjects in this group was much more marked than in the preceding groups. The White subjects came from a local private boarding school catering essentially for the White upper socio-economic group. The Xhosa subjects belonged to the same socio-economic group as the Xhosa subjects in Groups 1 and 2. The White subjects were either in their ninth or tenth year of schooling. The Xhosa subjects had received from 6 - 8 years of schooling.

The White subjects were all English-speaking. The White subjects in this group had a considerable socio-economic advantage over the White subjects in the first two groups.

The results for this group on the fear of snakes would enable a comparison to be made with previous findings showing a significant decline in the fear of snakes during the teenage period.

Group 4 (18 - 20 years). The White group consisted of first- and second-year university students. The Xhosa group was drawn from cleaners and gardeners employed by the university.

Jones and Jones (1928) reported an increase in the fear of snakes with age, their student group showing more fear than the children used

in their study. The use of White Group 4 will afford the opportunity of comparing the scores of South African students on behavioural measure of the fear of snakes with the findings of Jones and Jones' (1928) study.

The results of the Xhosa Group 4 will also be of interest. The educational attainment of this group was certainly no higher than that of the Xhosa subjects in Group 3, and was possibly even lower. A comparison of the results for Group 4 with those of Group 3 and even Group 2 will not have to take into account the possible influence of educational attainment on the fear of snakes.

Group 5 (over 25 years). The Xhosa group was composed of gardeners employed by the university. The White group consisted of non-academic staff members of the university and a number of office workers.

No data could be found in the literature on the fear of snakes for this age group. Russell's (1967) study was the only investigation that could be found which included subjects older than students. Russell included a group of "senior citizens" drawn from various old-age homes. Data to be provided by the present experiment on the fear of snakes in subjects of Group 5 will fill an obvious gap in our knowledge.

4.3. Problems in the Measurement of the Fear of Snakes

Methods which have been used to measure the fear of snakes can be classified into one of the three following categories : subjective or self-report measures, behavioural measures and GSR measures. There are problems of varying magnitude involved in the use of each of these methods. Self-report, behavioural and GSR measures, as well as those studies employing two or more measures of fear are considered below.

4.31. Self-Report Measures

Much of the data available on the fear of snakes has been provided by studies which have simply asked subjects to list their fears or have gathered data in the interview situation. This method has the obvious

advantage of facilitating large-scale surveys of a wide range of fears from large samples of subjects. However, few researchers have reported any attempt to establish the reliability and validity of their subject's reports.

It is generally agreed that to feel afraid is to be afraid. If this statement is accepted the question then arises as to whether the experience of fear is necessary as well as sufficient evidence of fear. The answer would have to be in the negative if the psychoanalytic concept of unconscious fears is accepted (Krause, 1961).

A further objection to the self-report measure of fear is that a subject may make an error in his recognition of fear, or he may incorrectly infer from certain experiences that he is afraid. The error may arise from the way in which a particular subject has learned to use the word "fear" or from a lack of sensitivity in self-observation (Krause, 1961).

Pratt (1945), who asked children to list "all the things you are afraid of", realised that the subjective report of fears may be selective rather than inclusive. There is always the possibility that the subject might repress or inhibit his expression of certain fears. Furthermore, Pratt stated that we cannot be certain that "affectivity attaches to the object or thing reported". These are problems faced by several of the studies reviewed in Chapter 3.

Azrin, Holtz and Goldiamond (1961) attempted to determine whether the social acceptability of certain fear reactions biases their reporting. A sample of students was asked to report the fear symptoms likely to be experienced by a pilot flying on a combat mission. The responses obtained from the subjects were almost completely predictable on the basis of response bias.

The social influences mentioned by Wilson (1966) have been investigated to a certain extent with reference to the Fear Survey Schedules (FSS).

Results on the FSS have consistently shown females to have a significantly higher fear rating of "snakes" and "harmless snakes" than males. This finding has been interpreted in various ways. Wilson (1966) proposed the explanation that it is more socially undesirable for males to admit certain fears than it is for females. This explanation received support from Wilson's (1966) study showing that males and females do not significantly differ in magnitude of GSR's to coloured slides of feared animals. No interaction was found between sex and picture type, even though the technique gave highly reliable and differential measurements of fear when pictures of known phobic objects were used.

Wilson (1967b) asked six judges to rank the 18 items on the FSS, receiving the highest fear rating, according to how "silly" they considered it to be for a person to have an intense fear of the particular object. It was found that the fears judged as "silliest" (e.g. "worms") were reported virtually exclusively by females, while the more reasonable fears (e.g. "sharks") were reported considerably more often by males. Wilson stated that this finding indicates that social desirability probably accounts for the consistent sex differences on the FSS.

Most of the problems mentioned above apply to the self-report studies reviewed in Chapter 3. A review of these studies gives the impression that they have not told us very much about the fear of snakes. Methodological shortcomings reduce their value still further.

The influence of social desirability was probably reduced in those studies employing a projective technique to obtain information on the subjects' fears. However, there appears little justification for Maurer (1965) assuming that her projective technique elicited more valid data than the approach asking children to list their fears. In using a projective technique there is always the possibility of the researcher obtaining not information on their subject's fears but on the fears the

subjects really do think other children have. The validity of the projective technique for eliciting data on children's fears has not been established.

Part of the study by Jersild and Holmes (1935) and the entire study of Lapouse and Monk (1959) relied on information gathered from mothers on the fears of their children. Is this a valid method of studying fears ?

Jersild and Holmes (1935) compared their findings with those of Holmes' (1935) behavioural study. The percentage of children reported by their mothers as fearing "animals" was 43.6%, while 61.6% of the children drawn from the same sample showed fear in the presence of a dog and/or snake.

Lapouse and Monk (1959) interviewed a number of children on their fears and compared these findings with the data provided by the mothers of the children. An agreement of only 51% was found between the data gathered by these two methods. In 4% of the cases the child denied a fear of snakes when the mother had reported the child as having this fear. On the other hand, in 24% of the cases the mother reported that the child had no fear of snakes while the child claimed he did fear snakes.

The most comprehensive self-report study of the fear of snakes is undoubtedly that of Morris and Morris (1965). One of the questions asked the respondents was which animals they disliked the most. Data obtained in this way was then discussed in relation to other findings on the fear of snakes. Morris and Morris clearly equated the dislike of snakes with the fear of snakes. Without citing supporting evidence it seems unjustified to assume that disliking snakes and fearing snakes is the same response.

The problems intrinsic in the self-report method appear to make it necessary to employ one or more other measures of fear on at least part

of the sample before accepting the self-report data as accurately measuring fear. Self-report measures would apparently be more appropriate measures of fear when social desirability is not an important factor. The judges in Wilson's (1967b) study rated the item "snakes" as having a low social desirability ranking in comparison to such items as "worms" and "moths". However, the social desirability ranking of the fear of "harmless snakes" (FSS-II) would undoubtedly have been considerably higher than the ranking for "snakes".

There is evidence to support the view that self-report measures are of doubtful validity in measuring the fear of harmless snakes. Because of the influence of social desirability, this is particularly of relevance to the measuring of the fear of snakes in males.

4.32. Behavioural Measures

These measures are based on the overt behaviour of subjects in the presence of a live snake. Only two such studies could be found in the literature.

A basic problem in behavioural measures was recognized by Jones and Jones (1928). They noted that while some of their adult subjects were prepared to handle a snake, their hands and faces were covered with beads of sweat. A number of adult subjects, while fearful, were for some reason determined to handle the snake. Jones and Jones recommended that a measure of autonomic arousal be used in addition to the behavioural test.

There has been a progressive refinement of behavioural measures. The study of Jones and Jones (1928) failed to provide a definition of fear nor were the criteria established for the classification of subjects into the various categories such as the "guarded" group or the "distinctly fearful" group. However, Holmes (1935) used a very stringent criterion of fear, i.e. a complete refusal to enter into the experimental situation

or a refusal to enter the experimental situation until the experimenter had done so. The behaviour of the child was recorded on a carefully prepared checklist of possible types of behaviour that could occur during the experiment.

A possible major defect in Holmes' study was the role of the experimenter as an extraneous variable in the subjects' behaviour. The experimenter played an active role in urging and reassuring the subject in his attempt to handle the snake. If the child refused to reach into the box containing the snake, the experimenter would stroke the snake and then encourage the child to do likewise. Could the actions of the experimenter have influenced the behaviour of the child? Flanders (1968) classified modeling behaviour, such as handling a feared object, as instances of vicarious reinforcement. Geer and Turteltaub (1967) showed how a "quite frightened" confederate increases the avoidance behaviour of a "high-fear" subject towards a snake. A confederate displaying "very little fear" towards the snake resulted in high-fear subjects moving closer towards the snake. These findings clearly show that the behaviour of the experimenter towards the feared object can produce changes in the behaviour of subjects. This extraneous variable was not controlled for in Holmes' study.

With the extensive use of systematic desensitization in the treatment of phobias, attention was focussed on the development of a valid pre- and post-treatment measure of the efficacy of behaviour therapy. The Behavioural Avoidance Test (BAT) has been widely used for this purpose since its introduction in 1960. Basically, it consists of a number of performance tasks requiring the subject to perform increasingly threatening interactions with a live snake. The subject's score is the number of the last item successfully completed. BAT's varying from 7 items to 34 items have been used. Several researchers have commented

on the high reliability of the BAT (e.g. Lang and Lazovik, 1963).

Up to the present only studies using the BAT on phobic subjects have been published. However, the BAT would appear to be an ideal instrument for measuring the fear of snakes in non-phobic subjects.

A persistent problem in the BAT has been the unequal intervals between scale items. In spite of intensive research this problem has not been entirely overcome. The 20-item BAT constructed by Nawas (1971) contains items which are not exactly of equal intervals but is the best approximation to equal intervals developed so far.

Bernstein and Allen (1969) suggested that if social desirability, experimental demand and other extraneous variables can bias scores on self-report measures, then these variables can also bias overt behaviour. Research on the influence of these variables on fear behaviour has still to be published.

4.33. GSR Measures

The early studies using the GSR as a measure of autonomic arousal were plagued by methodological problems. The measurement technique has been confronted with numerous sources of error, which have invalidated many of the earlier studies. Studies have been used for comparative purposes while neglecting to use the same type of apparatus and measuring unit. Until fairly recently little attention was paid to electrode technology, such as the size and placement of electrodes, type and purity of electrode metal and the chemical composition of the electrode paste. Recent research has overcome many of these problems (Lykken, 1959).

It has been argued that any particular physiological variable is a justifiable measure of fear because it indicates autonomic arousal. This is based on the convention that one cannot be afraid without the ANS being activated. If it is assumed that autonomic arousal indicates fear, the possibility cannot be discounted that it also indicates other emotional

states as well. The indication of autonomic arousal is not sufficient evidence of the emotion of fear; it could also indicate anger, for example. Therefore, if the GSR is going to be used as a measure of fear, we must have recourse to other evidence before we can conclude that our GSR measures are in fact measures of fear. The additional evidence can be provided by carefully choosing a stressor most likely to arouse fear rather than the other emotions, e.g. a snake. It is also desirable to have another measure of fear with which to compare our GSR measure (Martin, 1961).

In reviewing various physiological measures of fear, Martin (1961) reported that intercorrelations between these measures tend to be low and frequently non-significant. Lacey (1958) reported on earlier experiments showing that different subjects have different patterns of autonomic response. These patterns are reproducible over time and are consistent over various fear stimuli. Thus one may respond to a particular stressor with a large increase in heart rate and only a small decrease in skin resistance, while another subject might respond with a different pattern. Lacey's work suggests that an individual responds to stress with a characteristic pattern of responses. This emphasizes the need for checking GSR scores against some other measure, e.g. the BAT.

A series of experiments by Bolles (1968) questioned the whole concept of autonomic indices of fear. Three experiments were performed in an attempt to assess the role of fear in avoidance learning. A rat's skin resistance was measured just before and during the CS, and after the avoidance response occurred. The only finding of interest was a gradual drop in resistance during the course of a test session. In a further experiment using a conditional suppression situation, subjects received one or two shocks a session, while the controls received no shocks. To the experimenter's dismay, the controls' skin resistance dropped

to the same extent and at the same rate as did the subjects'. The third experiment employed Sidman avoidance behaviour in a shuttle-box. The results were slightly in the wrong direction.

Bolles (1968) suggested several explanations to account for his findings. Bolles favoured the explanation that fear, as it was conceived by James, Lange and Cannon, has nothing to do with fear as it is referred to by the two-factor theorists of avoidance behaviour. Bolles stated that in the end result "we know whether our Ss are frightened by how they respond, and not by what is going on in their autonomic nervous system."

Geer (1966) measured the GSR's of high-fear (HF) and low-fear (LF) subjects to pictures of a feared object. The HF subjects were those who had rated their fear of spiders on the FSS as "very much" or "terror". The LF subjects rated their fear of snakes as "none". The results confirmed Geer's hypothesis that HF subjects will show increased autonomic arousal when shown stimuli relevant to their fear. LF subjects did not show increased GSR's to pictures of spiders.

Wilson (1966) found no significant differences between the GSR's of non-phobic subjects to coloured slides of snakes, spiders and landscapes. However, when a phobic subject was shown a picture of the feared animal the GSR's were significantly higher than the subject's GSR's in response to pictures of animals not feared. These findings indicate that Wilson's procedure is an appropriate measure of fear only for phobic subjects.

There are no published data on the use of the GSR as a measure of the fear response to the actual feared object, e.g. a live snake. Geer (1966) expected his GSR measures to be considerably higher if a live spider had been presented to the subjects rather than pictures of spiders. The GSR measure of fear cannot be discounted because of Wilson's failure to discriminate between non-phobic subjects' responses to various slides.

The presentation of a live specimen of the feared object, as in the present study, might produce completely different results.

From this brief discussion it is apparent that there is no completely satisfactory measure of fear available at present. Krause (1961) stated that when a subject claims that he is afraid of some object, avoids that object when confronted with it and shows autonomic arousal as well, then "we cannot be more certain that he is in a state of fear". Zuckerman (1967) stated that "because affects are so vaguely defined, and there are so many tests purporting to measure them, the use of any single method to assess them is incautious". The views of Krause and Zuckerman have been heeded in the design of the present experiment.

4.34. The Relationship between Measures of Fear

Recent research has investigated the relationship between various measures of fear. These data have been supplied mainly by researchers investigating the efficacy of systematic desensitization on phobias. The findings are of particular interest because the snake has frequently been used as the stimulus object.

The Relationship between the BAT and Self-Report Measures of Fear

Lang and Lazovik (1963) used two self-report measures of the fear of snakes : The FSS item "snakes" and the Fear Thermometer (FT), a 10-point rating scale of fear developed by Walk (1956), and a BAT consisting of 19 tasks. The procedure adopted in the BAT was different to that used in later research. The experimenter first performed each task and then invited the subject to do the same. The possible effects of modeling behaviour on the fear of subjects has already been discussed and could be of relevance to the findings of this study.

An interesting finding in Lang and Lazovik's (1963) research is that when six of the snake-phobic subjects, who had handled a snake after behaviour therapy, were re-tested after 6 months, two of the subjects

refused to touch the snake. However, neither of the subjects showed an increase in self-reported fear and one subject actually showed an improvement on this dimension. This revealed a definite discrepancy between the BAT and self-report measures of fear for some of the subjects.

The findings of Lang and Lazovik's experiment revealed a generally positive relationship between the post-test self-report and BAT scores, however, it was surprisingly low. Furthermore, initial changes in phobic behaviour seemed to occur in either one dimension or the other, rather than in both simultaneously. Most frequently overt avoidance behaviour decreased with systematic desensitization before a corresponding decrease in self-reported fear. Thus, BAT scores differentiated between experimental and control subjects immediately following the experiment, but it was not until the following test 6 months later that the self-report measures yielded the same finding.

Geer (1965) reported a sex difference in the relationships between a BAT and several self-report measures of fear. Subjects were classified as being high, medium or low in their level of fear on the FSS-II item "strange dogs". In the behavioural test, a dog was securely chained in one spot and subjects were asked to approach it. Two measures were recorded during the test. One was the latency in seconds the subject took to perform the task, and the second was the distance from the dog when the subject refused to proceed with the test. When the scores for males and females were combined, each measure significantly discriminated between the high-, medium- and low-fear subjects, except the distance measure. For the females all the measures significantly discriminated between subjects of varying levels of fear, while for males only one of the three self-report measures revealed significant differences. In fact, all the male subjects, irrespective of the level of their self-reported fear, approached and touched the dog.

In an experiment using rats as fear stimuli, Geer (1966) found that all measures of fear successfully differentiated low- and high-fear female subjects. Geer's (1966) research indicates that the sex of the subject might influence the relationship between overt behavioural and self-report measures of fear.

Lanyon and Manosevitz (1966) employed a 9-item BAT and the Fear Thermometer (FT) on a group of subjects rating their fear of spiders as either "mild", "moderate" or "intense". While the FT provided results in the expected direction, i.e. the more intense the level of self-reported fear, the higher the rating on the FT, the results on the BAT were completely unexpected. A control group reporting no fear of spiders, approached a live spider only slightly more closely than subjects reporting a mild or moderate fear of spiders. There were no significant differences between the BAT scores of subjects reporting a mild, moderate or intense fear of spiders.

The correlation between several self-report measures, experimenter ratings and BAT scores were found by Lang (1968) to be "surprisingly low". Furthermore, the relationship between the change in one measure and the change another measure after systematic desensitization were "indifferently correlated".

Cotler and Garlington (1969) found that the BAT scores of their subjects revealed that these subjects were much less afraid of a snake, rat and spider then the FS-II ratings had implied.

An extensive study by Schroeder and Craine (1971) investigated the relationship between BAT scores and scores on eight self-report measures of the fear of snakes. Generally the correlations between the self-report measures and the BAT were low. For example, the correlation between the BAT and the FSS-II was 0.19 and between the BAT and FT, 0.27.

Fazio (1969) found significant correlations between self-reported fear and performance on the BAT. Using a 7-item BAT and the relevant

FS-III items, Fazio reported that in each of the 70 subjects, the more a subject claimed to fear an insect, the less the insect was approached or handled. However, these high correlations could have been the result of methodological factors. After the subject had completed the FSS-III, they were told that they were going to perform a test designed to verify their claims. This procedure could have produced response sets in the subjects and resulted in them behaving in the BAT in a way to justify their FSS ratings.

Research has, on the whole, revealed surprisingly low correlations between self-reported fear and overt behaviour in the presence of the feared object. There is some evidence to show that subjects tend to show less fear in the BAT than predicted by their self-reports of fear (Cotler and Garlington, 1969). No explanations have been offered to account for subjects exaggerating their self-reported fears. This is an extremely surprising result in view of the claimed influence of social desirability on the self-reporting of fears.

Relationship between GSR and BAT Measures of Fear

The research of Lacey (1953, 1958) showing low intercorrelations of physiological measures in a fear-producing situation does not hold out much hope of discovering consistently high correlations between BAT and GSR measures of fear. If individuals respond to fear-invoking situations with characteristic patterns of autonomic responses, it seems unlikely that any single physiological measure will correlate highly with a behavioural measure of fear.

Agras (1967) employed a GSR and a behavioural measure to study the effects of systematic desensitization on agoraphobics. Immediately following treatment there was a significant reduction in skin conductance in response to the feared stimuli. However, improvement in the behavioural measure occurred only after a considerable time lag. Changes in the

behavioural measure covaried with changes in the GSR measure in only one of the five subjects.

Findings in the opposite direction to those of Agras (1967) were reported by Barlow, Leitenberg, Agras and Wincze (1969). The latter researchers found that, following systematic desensitization, BAT scores of snake-phobic subjects increased (indicating a reduction in fear) without any general change in GSR scores.

These findings must be interpreted with caution because both Agras (1967) and Barlow et. al. (1969) took GSR measures while subjects imagined feared scenes, while the BAT involved the subject's reponses to the actual feared object. Procedural variables may account for the discrepancies between the GSR and BAT measures.

Relationship between GSR and Self-Report Measures

Maher (1966) stated that it is generally agreed by psychologists that the bodily changes which occur when someone is presented with a threatening stimulus contribute to the experience of fear and are themselves regarded as unpleasant. However, there are considerable individual differences in the degree to which individuals are aware of these bodily changes. These differences play a significant role in the individual's experience of fear. Maher suggested that at least two important variables affect the subject's perception and interpretation of fear : the extent of the bodily changes to the fear stimulus and the subject's estimate of it. In view of this, Maher stated that high correlations between physiological measures of fear and self-reports of fear cannot be expected.

Relaionship between Behavioural and Attitudinal Measures

In a review of research on attitude-behaviour consistency, Wicker (1970) reported that attitude-behaviour correlation coefficients seldom exceed 0.30, and are usually near 0.0. It was suggested that if the stimuli in the verbal situation were more similar to those in the overt behavioural

situations, the correlations would probably have been higher.

Bandura, Blanchard and Ritter (1969) correlated behavioural and attitude measures of non-phobic subjects towards snakes. It was found that positive attitudes towards snakes were positively correlated (0.73) with approach behaviour.

Conclusion

On the whole it has been found that different measures produce different estimates of fear intensity. Furthermore, individual differences have been found in changes of subjects' fear behaviour following systematic densensitization. Some subjects show significant improvement in overt behaviour, while others may show no increase in approach behaviour towards a feared object, but report less fear or appear more relaxed in the presence of the feared object (Lang, 1969).

Lang, Lazovik and Reynolds (1965) showed that different variables apparently control different aspects of the fear responses. In untreated subjects, closeness of approach to a snake in the BAT correlated with suggestibility as measured by the Stanford Hypnotic Suggestibility Scale. However, the subjects' self-rating of his fear on the Fear Thermometer and his score on the snake-item of the FSS did not show such a relationship.

The low correlations between various measures of fear are consistent with the proposal that "fear is not organized in a unitary way but has several components, for example, verbal, overt behavioural, physiological" (Bernstein and Allen, 1969)". Bernstein and Allen (1969) proposed that "Channel I (verbal report), Channel II (physiological) and Channel III (overt motor) measures of fear are relatively independent".

In view of the above findings and the necessity to use more than one measure of fear, an experiment with two measures of fear as well as self-reports was designed.

4.4. Apparatus

In order to assess direct and indirect experience of snakes, and attitudes towards snakes, the three questionnaires described below were designed.

4.41. The Personal Snake Experience Scale (PSES)

This scale was designed to measure the extent of the subjects' personal aversive experiences of snakes. The 10 items of the PSES were as follows :

1. Have you ever seen a live snake in captivity ?
2. Have you ever seen a live snake in the veld ?
3. Has anyone ever played a trick on you by frightening you with a toy or dead snake ?
4. Have you ever been frightened by a surprise encounter with a snake ?
5. Have you ever been close enough to a snake so that it could have bitten you ?
6. Have you ever had to take sudden action to avoid a snake, e.g. one lying in a path ?
7. Has a snake ever threatened you in any way ?
8. Have you ever killed a snake because you were convinced it was going to bite you ?
9. Has a snake ever attacked you ?
10. Have you ever been bitten by a snake ?

The items of the PSES were arranged in an order of increasing aversiveness, except for the first two items which do not involve unpleasant experiences with snakes. These two items were included to ascertain whether there were any subjects who in fact had never even seen a live snake before. The responses of these subjects to a live snake would be of particular interest.

Bandura, Blanchard and Ritter (1969) reported that 62% of the snake-

phobic subjects in their study claimed that they had, at some stage, been frightened by someone playing a trick on them with a toy or dead snake. Because of this finding the inclusion of item 3 was considered important.

Items 4 - 10 involve increasingly threatening encounters with snakes. On the basis of Rachman and Eysenck's (1965) theory of the development of phobias, it would be predicted that the greater the subject's aversive experiences of snakes, the more intense would be his fear of snakes. From this theory, we could justifiably predict that scores on the PSES would correlate significantly with scores obtained from the behavioural and physiological measures of the fear of snakes, i.e. the higher the score on the PSES, the greater the fear of snakes.

The scoring procedure for the PSES was as follows : if a subject gave an affirmative answer to only the first item, he was allocated a score of one. An affirmative answer to only item 2 would receive a score of two and so on. The subject's score was the number of the last item on the scale answered in the affirmative. The maximum score on this scale is 10, indicating that the subject had been bitten by a snake.

It is possible that one subject might answer the first four items in the affirmative and receive a score of four, while another subject might answer only the fourth item in the affirmative and also receive a score of four. For this reason the PSES was also statistically analyzed item by item. Groups of subjects were then compared not only with respect to their total PSES scores but also with respect to their responses on each item.

4.42. The Vicarious Snake Experience Scale (VSES)

The VSES was administered to each subject in an attempt to estimate the extent of the subject's vicarious aversive experiences of snakes. The 10 items of the VSES were as follows :

1. Do you know anyone who is unduly afraid of snakes ?
2. Are any of your friends unduly afraid of snakes ?
3. Are any of your immediate family-members unduly afraid of snakes ?
4. Have any of your teachers, close friends, or family members warned you about snakes ?
5. Have you ever read a book or seen a film in which someone has been harmed by a snake ?
6. Have any of your close friends or family members told you frightening stories about snakes ?
7. Do you personally know anyone who has been bitten by a snake ?
8. Have any of your close friends or family members been bitten by a snake ?
9. Have you ever seen anyone being attacked by a snake ?
10. Has a close friend or family member died as a result of snake-bite ?

Each of the above items describes a situation which could be a source of vicarious aversive experience of snakes. The items were ranked from 1 - 10 to reflect increasingly aversive experiences. This scale was scored in the same way as the PSES.

The work of Bandura, Blanchard and Ritter (1969) suggested the importance of vicarious experiences of the fear of snakes in the development of snake-phobia (See "Antecedents of the fear of snakes", p.41). A large percentage of Bandura et. al's. subjects reported that they had witnessed snake-phobic behaviour in at least one of their immediate family members. The first three items of the VSES were included to obtain this sort of information from the subjects in the present experiment.

Morris and Morris (1965) believed that the mass media in Britain were, to some extent, responsible for communicating erroneous information about snakes to children. This information, invariably unfavourable to the snake, played a role in the development of a fear of snakes. Teachers and

parents were also frequently guilty of exaggerating the danger of snakes. These views contributed to the inclusion of Items 4, 5 and 6.

A possible source of strong vicarious aversive experience of snakes is the personal knowledge of someone who has actually been physically harmed by a snake. This would be particularly intense in the case of a close friend or a family member. Witnessing someone being attacked by a snake would be likely to increase the viewer's fear of snakes. Items 7 - 10 describe these types of experiences.

The influence of vicarious factors has been experimentally investigated by Geer and Turteltaub (1967). They attempted to assess the effect of observing the behaviour of others in the presence of a snake upon the subjects' subsequent reactions when confronted with a snake. This study clearly demonstrated that if an individual who is afraid of snakes observes another person behaving non-fearfully towards a snake, there is a tendency for the observor's fear behaviour to be reduced. This finding was interpreted in terms of Bandura and Walters' (1963) social learning theory.

The research findings presented above clearly indicate the possibility that vicarious aversive experience of snakes is an important factor in a subject's fear of snakes. It can be predicted that the greater the subject's vicarious aversive experience of snakes, the more intense will be his fear of snakes.

With the scoring procedure adopted for the VSES, it is quite possible that two subjects may receive the same score, e.g. 6, with the one subject only answering Item 6 in the affirmative, while the other subject answered each of the first six items in the affirmative. The VSES includes items involving different types of vicarious aversive experiences, making the situation just described even more likely to occur in the VSES than in the PSES. Therefore, an item by item analysis of the VSES will be included in the analysis of the results.

4.43. The Snake Attitude Scale (SAS)

The SAS was intended to measure the extent of a subject's negative attitudes towards snakes. Most of the items test the irrationality of the subject's attitudes towards snakes.

Ten sets of polar adjectives constitute the SAS. Each subject was asked to choose one of the two adjectives best expressing his attitude towards snakes. If the subject did not agree with either adjective he could respond with "Neither". The SAS was presented to the subjects as follows :

1.	Do you regard snakes as being	Good	Evil	Neither?
2.	Do you believe that snakes are	Dirty	Clean	Neither?
3.	Do you find snakes	Beautiful	Ugly	Neither?
4.	Do you believe that snakes are essentially	Aggressive	Friendly	Neither?
5.	Do you believe that snakes are	Nice smelling	Stinking	Neither?
6.	Do you believe that snakes are	Slimy	Dry	Neither?
7.	Do you believe that most snakes are	Harmless	Dangerous	Neither?
8.	Do you find snakes	Creepy	Pleasant	Neither?
9.	Do you believe that snakes are	Firm	Slippery	Neither?
10.	Do you regard snakes as being	Worthless	Valuable	Neither?

In five of the items the positive adjective was read first and in five of the items the negative adjective was read first. The reasons for the inclusion of these particular polar adjectives are given below.

1. Good - Evil. This item was included because the Christian tradition and the Xhosa's association of the snake with witchcraft possibly leads to the snake being associated with the sinister.

2. Dirty - Clean. Morris and Morris (1965) gathered data on British children's reasons for disliking the snake. One of the most frequently mentioned reasons was that the snake is dirty. However, snakes are

particularly clean animals.

3. Beautiful - Ugly. Subjects in Morris and Morris' (1965) study who claimed they liked snakes most frequently justified their attitude by referring to the snake's beautiful markings.

4. Aggressive - Friendly. The popular belief that snakes are essentially aggressive is entirely erroneous. Isemonger (undated) reported that in catching over 2,000 snakes over a period of 25 years, a snake never made an unprovoked attack.

5. Nice smelling - Stinking. Snakes have no smell at all. This item was included as a further test of the accuracy of the subject's beliefs about snakes.

6. Slimy - Dry. The most frequently mentioned reason for disliking snakes in Morris and Morris' (1965) research was the belief that snakes are slimy. Snakes are in fact completely dry.

7. Harmless - Dangerous. The great majority of snakes in South Africa are relatively harmless. Only 25 forms out of a total of 135 forms are capable of causing death in man (Fitzsimons, 1962).

8. Creepy - Pleasant. Many of the subjects in Morris and Morris' (1965) study reported that they found snakes creepy.

9. Firm - Slippery. Because of their dry skins, snakes are firm to the touch, particularly those with rough skins. Many subjects who responded to Morris and Morris' (1965) questions believed that snakes are slippery.

10. Worthless - Valuable. Fitzsimons (1962) stated that snakes play a valuable role in the economy of a country, particularly those snakes which prey on rodents and insects.

Items 1, 2, 4, 5, 6, 7, 9 and 10 provide information on whether the subjects' attitudes towards snakes are based on facts or on the

widespread misconceptions about snakes apparently held by a large proportion of the population. Items 3 and 8 were included to elicit information on whether the subject's personal response to a snake is positive or negative.

The SAS was scored as follows : Two points were awarded for every negative adjective chosen by a subject. The response "Neither" received one point, while each positive adjective was scored zero. The possible range of scores on the SAS is 0 - 20, with 0 indicating an extremely positive attitude, and 20 indicating an extremely negative attitude towards snakes.

4.44. Behavioural Avoidance Test (BAT)

The BAT has been extensively used by behaviour therapists to measure the effects of systematic desensitization on phobic behaviour. The BAT consists of a number of performance tasks which lead the subject into increasingly threatening interactions with a live snake housed in a cage. BAT's varying from 7 to 38 performance tasks have been used. The first performance task always involves the subject standing some distance away from the snake's cage. The final performance task requires the subject to at least hold the snake outside the cage for a set period of time, and usually to allow the snake to make contact with some part of the subject's body.

The subject's score on the BAT is the number of the last performance task that he is prepared to complete, i.e. the higher the subject's score the less is his fear of snakes. The test is terminated when the subject is not prepared to attempt a particular task on the test. Several researchers, e.g. Lang and Lazovik (1963), have commented on the high reliability of the BAT.

As was mentioned earlier in this chapter, one of the most persistent problems involved in the use of the BAT has been the highly unequal

intervals between performance tasks. Nawas (1971) attempted to resolve this problem. As a subject proceeded to perform the hierarchy of 20 performance tasks, she was asked to indicate, alongside each item, the number of subjective units of disturbance (SUD) each performance task evoked in her. Subjects were told that the first performance task should be given one SUD, and the twentieth task should be given 100 SUDs. The remainder of the tasks were to be awarded SUDs of between 1 - 100.

Starting with a 34-item BAT, the above process was repeated again and again with groups of subjects reporting different degrees of the fear of snakes. The end result was Nawas' (1971) BAT to be described below. This BAT is not of exactly equal intervals but is the best approximation that has been obtained to date. For this reason, Nawas' BAT was chosen as the behavioural measure of fear in the present experiment. The 20 performance tasks of the BAT are as follows :

1. Stand 8 ft. away from the snake, looking at the cage.
2. Stand 5 ft. away from the snake, looking at the cage.
3. Stand 3 ft. away from the snake, looking at the cage.
4. Stand 1 ft. away from the snake, looking at the cage.
5. Stand next to the cage and look down at the snake through the cover.
6. Place your hand against the glass nearest the cage.
7. Open the cage.
8. Now look down straight at the snake.
9. Hold a ruler and put it into the cage without touching the snake.
10. Hold a ruler and touch the snake with it.
11. Put on a glove and put your hand into the cage without touching the snake.
12. Now touch the snake.
13. Put your hand into the cage without touching the snake.

14. Now touch the snake.
15. Stroke the snake with your bare hand.
16. Reach into the cage and pick up any part of the snake an inch or two and then put it down.
17. Reach into the cage, pick up the snake and hold it outside the cage for 5 seconds.
18. Reach into the cage, pick up the snake and hold it outside the cage for 15 seconds.
19. Reach into the cage, pick up the snake and hold it next to your chest for 15 seconds.
20. Reach into the cage, pick up the snake, stroke it, and allow it to crawl on your arm.

4.45. The Dermograph

The relationship between psychological phenomena and changes in skin resistance have been studied for over a century. Both resistances and conductance measures have been extensively used. The changes in skin conduction or skin resistance have been assessed by two basic techniques. The relationship between specific emotional changes and changes in skin resistance were noted by Féré (1888). Féré employed the exosomatic measuring technique. This technique is based on the changes in skin resistance to a small current supplied by an external source and passed through the subject by means of electrodes generally fixed on the palm and back of the subject's hand (Grossman, 1967).

Tarchanoff (1890) advocated the use of the endosomatic GSR technique. This procedure does not use an external source of current because any two areas of the skin show a potential difference between them. Following any sensory stimulation, this voltage shows a marked change (Grossman, 1967).

It has been widely accepted that both of the above techniques

reflect the sudomotor activity of the sweat gland membranes which are under the direct control of the sympathetic nervous system. These sudomotor responses are controlled by reflex centres in the brain (Grossman, 1967).

Montagu and Coles (1966) stated that the GSR is the "most sensitive indicator of psychological events available to the psychologist". However, until recently the many problems involved in the measurement of the GSR have prevented it being used extensively as a measure of fear. The recent studies using the GSR as a measure of fear (Geer, 1966; Wilson, 1966) have already been reviewed in this chapter. These studies used the endosomatic GSR technique.

Wilson's (1966) study indicated that the recording of GSRs to coloured slides was not applicable to the measurement of fear in non-phobic subjects. The findings of Wilson's study might have been quite different if a live snake had been used as a stimulus rather than pictures of snakes. A study using a GSR measure for reactions to a live snake is quite justifiable.

Montagu and Coles (1966) reviewed the research on the large number of variables which have been claimed to influence the GSR. However, assessments of the effects of these variables has been made extremely difficult by the diversity of the techniques used in the earlier investigations. Furthermore, a large number of potentially important studies have been invalidated because of the use of inappropriate units of measurement.

There is uncertainty regarding the influence of temperature and humidity on the GSR. However, it has been shown that skin conductance is generally lower at night than during the day, reaching a maximum around midday (Montagu and Coles, 1966).

Two variables which have been shown to influence the level of the GSR, and could be of importance in the context of the present experiment, are age and race of the subjects. Obrist (1948) and Jones (1949) reported that skin conductance increases through adolescence until it reaches about twice the pubescent level. Mundy-Castle and McKiever (1953), using adult subjects, found no relationship between age and the resting GSR level (Montagu and Coles, 1966). In the present experiment we will be interested in changes in skin resistance following stimulation. Comparisons of basal skin resistance will not be made. The findings of the research on the variable of age will not be of consequence in the present experiment.

Johnson and Corah (1963), working separately, noted that the basal skin resistance of American Negro subjects was uniformly lower than the basal skin resistance of comparable White American subjects. However, no significant differences were found between the GSRs of Whites and Negroes upon the presentation of a loud sound produced by a buzzer.

Research findings have shown that there are differences in the basal skin resistance between certain age and race groups. However, there is no evidence indicating that the magnitude of the GSR to some specific stimulus is a function of age or race. This is of particular importance to research, such as the present experiment, which is concerned with the magnitude of the GSR to a fear stimulus.

The dermograph used in the present experiment is part of the Stoelting Deceptograph which was specifically designed for use in criminal and "delicate personnel screening examinations". The dermograph records changes in the electrical resistance of the skin due to emotional arousal in the subject. The amplifier provides the means for automatic centering to keep the pen on the chart, irrespective of gradual resistance changes. Small changes in skin resistance are picked up by two finger electrodes

and are amplified and fed into a recording galvanometer which drives an ink-writing pen. The length of the arc of the pen from the base-line of the chart is a measure of the subject's response to a stimulus as recognized by the electrodes from a general resistance level.

Lykken (1959) advocated the use of zinc electrodes in the measurement of the GSR. Electrodes were prepared according to Lykken's dimensions for use in the pilot study. The zinc electrodes were embedded in a perspex rod with 1/8 inch of the electrode protruding from the perspex rod. A zinc sulphate electrode paste on a given tragacanth base was used. Several methods of attaching the electrodes to the volar finger tips of the subjects were tested. However, it was found that, irrespective of the method of attachment, these electrodes were particularly susceptible to picking up the movements of the subject's fingers. Even the slightest movement of the subject's fingers led to a movement of the pen on the chart. The problem was particularly acute in the case of young children, the vast majority of whom experienced great difficulty in keeping their fingers entirely still during testing. With the pen continuously recording changes in resistance due to the movement of the subject's fingers, the recording of GSR changes in response to the stimulus was virtually impossible.

This problem was almost entirely overcome by using stainless steel electrodes supplied with the Stoelting apparatus. These electrodes were 3.2 cm. long and 2 cm. wide. The electrodes were curved according to the shape of the finger. Because of the size and shape of the electrodes they could be firmly attached to the subject's fingers by means of cellotape. Slight movements of the subject's fingers did not affect the GSR recordings and larger movements, while producing a movement of the recording pen, could easily be distinguished from the GSR readings in response to the stimulus.

The general idea for the GSR Test (GSRT) used in the present experiment was obtained from the procedure used by Barlow, Leitenberg, Agras and Wincze (1969). Barlow et. al. measured the GSRs of snake-phobic subjects while they moved a snake, enclosed in its cage, towards the subject in three stages. While the GSR was continuously being recorded, the snake was initially situated 7 ft. away from the subject, then moved to 5 ft. away, and, finally, to 3 ft. away. This procedure was used as a pre- and post-treatment measure to determine whether systematic desensitization would result in a decrease in the GSRs of snake-phobic subjects to a live snake.

A procedure consisting of 10 performance tasks, to be performed by the experimenter, was developed for use in this experiment. This procedure will be referred to as the GSRT. While the subject was seated and kept his eyes on the snake, the experimenter performed the GSRT. A continuous recording was made of the subject's GSRs. The 10 performance tasks constituting the GSRT were as follows :

1. The snake's cage, on a trolley, was positioned 10 ft. away from the subject.
2. Trolley positioned 7 ft. away from the subject.
3. Trolley positioned 4 ft. away from the subject.
4. Trolley positioned against the subject's legs.
5. Snake touched with ruler by the Experimenter.
6. Snake touched with gloved hand by the Experimenter.
7. Experimenter placed his hand 1 inch from the snake's head.
8. Experimenter stroked the snake.
9. Experimenter lifted part of the snake approximately 4 inches above the bottom of the cage.
10. Experimenter lifted the snake and held it above the cage with the snake's head approximately 3 ft. from the subject's face.

A minimum of 20 secs. elapsed between the performance of each task. The criterion for a GSR was the same as that used by Wilson (1966). If a change in skin resistance occurred within 4 secs. of the performance of the task, then the maximum decrease in resistance during a 10 secs. period from the performance of a task was recorded as the GSR to a particular performance task. If no change in resistance occurred during a 4 sec. period following the performance of a task, then it was taken that no GSR had occurred.

The GSR recordings were analyzed as follows : Each GSR meeting the above criterion was measured and converted into ohms. The GSRT was then split into two sections : Items 1 - 4 and items 5 - 10. During the first four items the snake was not touched, while items 5 - 10 involved the Experimenter in making contact with the snake in various ways. The highest GSR occurring in response to the first four items was compared with the highest GSR occurring during items 5 - 10. The rationale for this procedure of analysis of the GSR data was that high-fear subjects should show a greater percentage increase, between the highest GSR occurring before the snake was touched and the highest GSR after the snake was touched, than low-fear subjects. High-fear subjects on the BAT should show a progressively greater increase in fear during the GSRT than low-fear subjects on the BAT. This would be verified by comparing the percentage increases in GSRs for items 1 - 4 and items 5 - 10 for subjects showing high-fear and low-fear on the BAT.

Figure 1 shows the electrodes attached to a subject's fingers. Figure 2 shows a GSR recording.

FIGURE 1. Electrodes attached to subject's fingers.

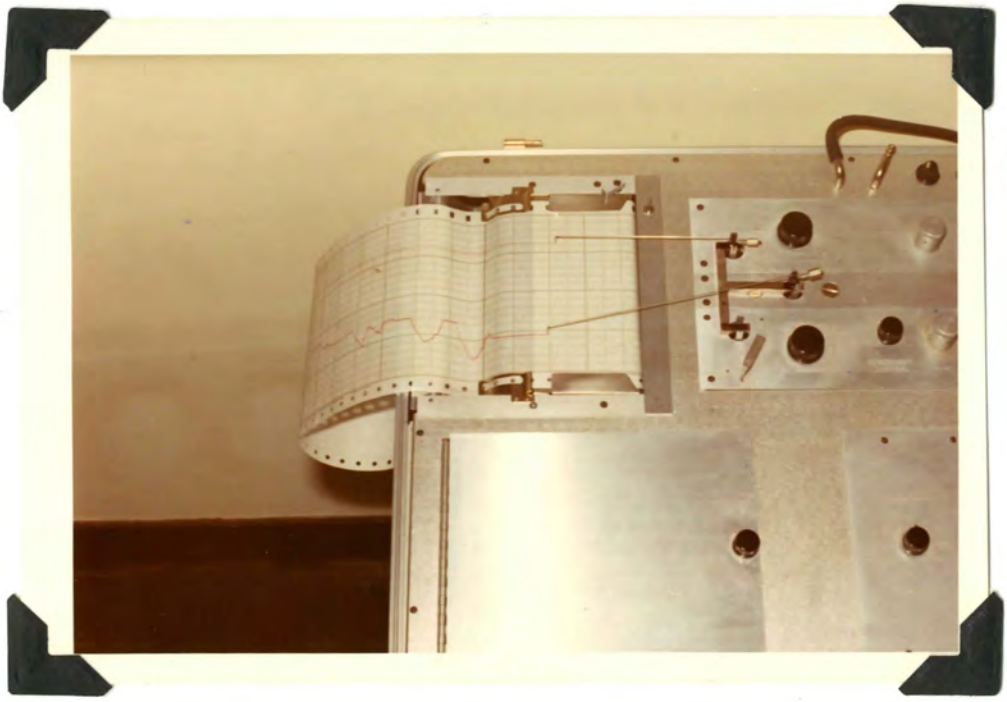


FIGURE 2. A GSR recording.

4.46. The Snake

The snake used in the BAT and the GSRT was a Rhombic Egg-Eater (Dasypeltis scabra scabra). This snake was obtained from the Port Elizabeth Snake Park.

The snake was 2 ft. 6 ins. long and $1\frac{1}{2}$ inches in diameter at the middle of the body. The snake was housed in a glass aquarium tank 3 ft. x $1\frac{1}{2}$ ft. x $1\frac{1}{2}$ ft. The top of the tank was covered by a fine wire mesh screen. Small stones were spread on the floor of the tank. A 60 watt light bulb was suspended over one corner of the tank to provide warmth for the snake.

FIGURE 3. The Rhombic Egg-Eater.

The Rhombic Egg-Eater possesses certain unique characteristics which made it ideal for this experiment. The snake is harmless, it is non-poisonous and has only very small, rudimentary teeth set far back in its mouth. Even under extreme provocation it never made an attempt to bite the Experimenter, although it did act in a rather frightening way, lunging at any offending object.

For the BAT and the GSRT to be valid measures of fear in the present experiment, it was essential for the snake's movements to be controlled. If the snake moved during the testing of one subject and not during the testing of another subject, then both the BAT and the GSRT would be invalidated. The Rhombic Egg-Eater was very inactive remaining almost permanently in the corner of the cage over which the light bulb was suspended. Just before testing the light-bulb was switched off and the snake remained inactive during the testing of each subject.

When the snake was first obtained from the Snake Park it was extremely wild. As soon as a hand was placed in the cage, it lunged rather than struck at the intruding object. This behaviour, combined with the loud "hissing" noise produced by the snake rubbing its scales together, would have dissuaded all but the bravest of subjects from attempting to touch the snake. This behaviour was completely eliminated by handling the snake several times daily for approximately a month. The snake's aggressive behaviour only reappeared if the snake was handled roughly. By the time testing was begun, the snake made no movement at all when touched or stroked, and only made a lethargic forward movement when lifted.

The markings of the Rhombic Egg-Eater are almost identical to that of the Night-Adder. Its appearance is that of a "real" snake. The Common Brown Egg-Eater, for example, appears quite innocuous in comparison to the Rhombic Egg-Eater.

4.5. Procedure

The White subjects were tested by the Experimenter. In the case of the Xhosa subjects a Xhosa research assistant administered the three questionnaires. The pilot study revealed that Xhosa subjects found it easier to comprehend the Xhosa assistant than the Xhosa spoken by the

Experimenter. The instructions for the BAT and GSRT were also given to the Xhosa subjects by the Xhosa assistant. The performance tasks on the BAT were given by the Experimenter and the GSRT was performed by the Experimenter for all subjects.

Before the subject entered the test room, the snake's cage was placed on a trolley which was positioned in the far corner from where the subject would be seated. The snake's cage was completely covered with a cloth. Upon entering the test room the subject was asked to sit on a chair approximately 15 ft. from the snake's cage When the subject faced the Experimenter, the cage was to the right and behind the subject. The initial seating of the subject was chosen to prevent the subject having to look at the covered cage and then asking questions about it. If the subject did ask about the cage, the Experimenter replied, "I am going to tell you about it just now."

After the subject's name and age had been recorded the PSES and the VSES were administered. The PSES was preceded by the following statement : "I am now going to ask you a few questions about your experiences with snakes and what you have heard about snakes from other people. There are no right or wrong answers. If you are not certain about an experience, then answer 'No'." Some of the younger children quite obviously exaggerated the extent of their aversive experiences of snakes. The Experimenter asked for details of these experiences and in several cases a subject changed his mind about having undergone a particular experience.

Once the PSES and VSES had been completed the subject was told by the Experimenter, "I am interested in finding out what you think of snakes. I am going to ask you a few questions and I want you to give me your personal opinions. There are no right or wrong answers." The SAS was then administered.

The next task to be performed by the subject was the BAT. The instructions for the BAT were given as follows : "In the corner behind you, over there, under the sheet, is a glass cage containing a live snake. The snake is completely harmless. It is non-poisonous and it does not bite. I am going to ask you to do a number of tasks. As soon as you feel afraid and you do not wish to perform a particular task you must please tell me immediately. Don't force yourself to do anything you don't want to do." If during the test the subject asked for any relevant information regarding the snake, e.g. confirmation that it really was non-poisonous and did not bite, he was told immediately. The BAT tasks were read out one at a time. The Experimenter stood just behind and to the right of the subject throughout the test. If the subject reached step 10, it was stressed that the snake should be touched very lightly and not on its head. Provided this was done the snake did not move at all. Those subjects who were prepared to lift the snake were told by the Experimenter to pick the snake up in the middle of its body with the subject's fingers around and under the snake. If the snake was lifted near its head it wriggled strongly. After the subject had expressed his desire to discontinue the test because he was frightened, the snake's cage was closed and covered with the cloth.

The subject was then instructed to sit on a chair placed next to the dermograph. The Experimenter stated : "I am now going to attach these two things to your fingers. You won't feel anything at all. This machine does not give shocks or hurt in any way." Most of the subjects asked about the function of the machine. The Experimenter promised to explain the purpose of the machine at the end of the test. Many of the subjects, particularly the Xhosa subjects, were very suspicious of the dermograph. Strong reassurances were necessary to convince these subjects that they would not receive an electric shock.

The subject was asked to place his left hand on the table holding the dermograph with his palm upwards. The volar finger tips of the phalange of non-adjacent fingers were cleaned with ethyl alcohol to remove excess body oils. In the case of some of the adult subjects, particularly the Xhosa subjects, the skin of the finger tips were rough and calloused. The skin was then rubbed with light emery paper and cleaned again with ethyl alcohol. The method of attaching the electrodes was chosen so as to reduce the effects of slight finger movements on the GSR recording. The flex from the electrodes was held against the surface of the finger by means of rubber bands. A strip of cellotape on the back and front of each electrode held them firmly against the fingers of the subject.

The dermograph was then switched off and one minute was allowed for the machine to warm-up and for the electrodes to reach skin temperature. The GSRT was commenced by switching on the chart paper device which fed the paper under the pen at the uniform speed of 6 inches per minute. The sensitivity of the amplifier was moved from the zero position to a sensitivity value between 25 and 50 (total range 0 - 100) depending on the magnitude of the subject's spontaneous GSRs. The sensitivity was adjusted until spontaneous GSRs did not exceed 500 ohms over a period of 15 secs. The subject was then instructed as follows : "What I want you to do now is to sit very still and not move your fingers at all. Please do not speak and keep your eyes on the snake all the time, watching what I do. I will not remove the snake from its cage. If at any stage you feel very uncomfortable, please feel free to tell me and I will stop immediately." The cover of the snake's cage was removed and the 10 steps of the test performed. The commencement of each step was marked on the chart paper by means of a pen-marker activated by the Experimenter.

After the completion of the GSRT, the trolley was moved to its original position and the electrodes removed from the subject's fingers.

The subject was thanked for his co-operation.

5. RESULTS, DISCUSSION OF RESULTS AND CONCLUSIONS

5.1. Qualitative Observations

The intention of this section is to provide a picture of the subjects' behaviour, not recorded as scores on tests, exhibited during testing. Of necessity these observations have been summarized, but the reader should gain a meaningful insight into the experimental situation and the types of responses subjects made to it.

During the testing programme, it became apparent that subjects were responding to the experimental tasks in a number of quite different ways. For example, two subjects might obtain the same score on the BAT, nevertheless, performed it in completely different ways with the one subject showing no apparent hesitation and the other subject showing extreme caution and hesitancy. These differences were not reflected in the BAT scores.

Many of the subjects asked the Experimenter certain questions before the BAT and the GSRT. These questions often provided valuable insights into the subject's beliefs about snakes. A number of examples will be given below. This type of information was not reflected in the quantitative scores recorded for each of the five measures.

The questions of the PSES and VSES were intended to be easily understood by subjects in each of the age groups. The prompt and confident replies to the questions indicated that they were being easily comprehended.

It was particularly noticeable among the older White subjects that they were keen to relate their experiences with snakes to the Experimenter. The Experimenter deliberately encouraged the younger subjects to talk about their experiences with snakes, rather than simply answer a series of questions. In this way rapport was easily established with the subjects.

The accounts given by subjects could easily be classified into the types of experiences contained in the questions of the PSES.

From the outset of the testing of the younger subjects in Groups 1 and 2, it became obvious that a number of subjects were exaggerating their experiences. An attempt was made to overcome this problem by asking for details of the claimed experiences, e.g. the name of the friend who had been bitten by a snake. This procedure sometimes led to a subject reversing his positive reply to a particular question.

The fact that some of the young boys were exaggerating their personal aversive experiences with snakes was easily perceived in a number of cases. For example, one 6 year-old White boy claimed that he had been bitten by a Puff-Adder. When asked by the Experimenter what the colour of the snake was, the surprising reply was "green". The claimed size of the snake was even more surprising, "as long as this wall", i.e. the wall of the testing room, approximately 20 ft. long.

The motivation for exaggerating personal aversive experiences with snakes was apparently the desire for status. High status is apparently accorded the boy who can claim to have had some dramatic experience with a snake.

The first question on the VSES is "Do you know anyone who is unduly afraid of snakes?" Ten White subjects in Groups 1 and 2 replied "Kaffirs" or "Natives". This confirms the statement made in Chapter 4 that there is a tendency for Whites to believe that Xhosas are exceptionally afraid of snakes.

Xhosa subjects responded to the items on the SAS without hesitation. A large number of Xhosa subjects in Groups 4 and 5 responded to the SAS items with real conviction and in some cases with vehemence. Attitudes towards snakes were obviously strongly held.

The White subjects in Groups 3, 4 and 5 tended to respond to the

SAS items with a great deal more hesitation than the Xhosa subjects in these age groups. Numerous White subjects asked for clarification of some of the items on the SAS before giving a reply. The Experimenter was frequently asked by subjects, particularly in Group 4 (university students), to define what was meant by some of the adjectives, e.g. "Good". It soon became obvious that many more Whites than Xhosas preferred the reply "Neither" to items on the SAS.

Before the commencement of the BAT, subjects were told that the snake in the cage before them was non-poisonous and did not bite. It was emphasised that the snake was completely harmless. The vast majority of subjects, both Xhosa and White, sought further reassurance during the BAT. The Experimenter was frequently asked : "Are you sure that the snake is non-poisonous?" "Will it jump at me?" "How quickly does it strike?" "Does it spit?" "Isn't it going to bite me?" Some subjects seemed to find it extremely difficult to accept the fact of a completely harmless snake.

With no more than five exceptions, all subjects exhibited some hesitation or apprehension about the performance of the BAT tasks. One subject expressed disappointment about not being requested to put the snake down his shirt.

There were clear inter-subject differences in how they performed the BAT tasks. The behaviour of each subject could be classified into one of the following approaches to the BAT :

(i) The subject performed all the tasks without any overt sign of hesitation or fear.

(ii) The subject performed a certain number of tasks without any apparent uneasiness and then quite unexpectedly refused to attempt the next task.

(iii) As the test proceeded the subject's hesitation increased and his

growing uneasiness became quite apparent to the Experimenter. The Experimenter was able to predict, with some accuracy, from the subject's performance of the previous task, whether the next task would be completed.

(iv) The subject performed tasks with obvious discomfort, but persisted with the test. In several cases a subject made a number of unsuccessful attempts to perform a particular task, but when asked by the Experimenter if he did not wish to discontinue, he refused and made yet another attempt. If a subject made an unsuccessful attempt to complete a task, the Experimenter asked the subject if he was afraid. The BAT was terminated upon the admission of fear. The instructions for item 14 were, "Now touch the snake". A number of subjects responded to these instructions in the following way : The subject looked at the snake for perhaps 10 secs. and then suddenly shot out his hand with index finger extended, touched the snake, and then withdrew his hand from the cage with great haste. Item 15 was invariably not attempted following this behaviour on Item 14.

(v) The subject was obviously uneasy at the thought of performing a particular task. The subject made a half-hearted attempt to complete a task and then informed the Experimenter that he no longer wished to continue with the test.

Only one subject, a Xhosa man, refused to begin the BAT. After the instructions for the BAT had been given, the subject insisted that he was completely unafraid of snakes, but that whenever he saw a snake he killed it without hesitation. The subject refused to undergo the BAT unless the Experimenter promised to allow him to kill the snake. In spite of a great deal of argument and persuasion by the Xhosa assistant, the subject remained adamant. The BAT could definitely not be undertaken with the

conditions insisted upon by the subject. This subject showed no overt fear during the GSRT.

The Xhosa subjects in particular were very suspicious of the apparatus used to measure GSRs. Many required the assurance that they would not receive an electric shock before they would agree to undergo the test.

Before the commencement of the GSRT, subjects were asked not to speak during the test. The importance of complying with this instruction was emphasized. However, during the test, 31 of the Xhosa subjects and 22 of the White subjects either asked a question or made a statement which the Experimenter interpreted as revealing apprehension or fear. These utterances were recorded by the Experimenter.

Of particular interest is the fact that six of the Xhosa subjects who quite obviously showed fear during the GSRT, showed a 0% increase in GSRs. Three of these subjects produced no measurable GSRs at all. A number of examples of these subjects' behaviour are given below.

In the youngest Xhosa group, S12, during the last step of the GSRT, pushed himself as far back as possible in his chair, turned his face away from the snake and said "Musa ukuyibeka le nyoka kum" ("Don't put that snake on me"). In spite of this subject's obvious agitation, the GSRs at no stage exceeded a 1000 ohm change in skin resistance and the percentage increase in GSRs was 0%.

A Xhosa boy, in Group 2, seemed quite composed until the final step of the GSRT. As the snake was lifted out of the cage, the subject ducked and said, "Jo! La nyoka iza kunditsibela" ("Jo! That snake is going to jump on me"). The GSR for this step was no larger than the GSR for the earlier steps of the test when the subject showed no overt fear.

In the oldest Xhosa group, S96, showed marked overt fear. During step 10 of the GSRT this subject pushed his chair back approximately 6 ins.,

held his head as far back as possible, and exclaimed, "Hayi! Musa ukuyi-sondeza lo nyoka kum" ("No! Don't bring that snake closer to me"). No GSR was recorded for this step of the test.

Of the 22 White subjects who made some utterance of protest during the GSRT, four recorded a 0% increase in GSRs. Two examples of these subjects' behaviour are given below.

The 19th. subject in the youngest White group became agitated after the seventh step in the GSRT. During Step 10, the subject crouched in his chair and exclaimed "Pasop! Daai slang gaan my byt" ("Watch out! That snake is going to bite me"). When the Experimenter removed the electrodes from this subject's fingers it was noticed that his hands were trembling. Although the GSRs for Steps 7 - 10 ranged between 2500-4000 ohms, the GSRs for Steps 3 and 4 were 3200 and 4000 ohms, respectively. This produced a 0% increase in GSRs.

Another subject in the youngest White group, S103, became agitated during Step 9 of the GSRT. During the final step, as the snake was lifted out of the cage, the subject moved his head back as far as possible and claimed, "The snake is coming too close now." Tears began to form in this subject's eyes. The GSRs for Steps 9 and 10 showed a 0% increase over the GSRs for the earlier steps.

Of the 200 subjects tested, 10 showed distinct signs of fear during the GSRT without an increase in GSRs. Four subjects produced no measurable GSRs while at the same time showing overt signs of fear.

These findings can be explained in terms of the research reviewed by Martin (1961). Individuals respond to stress with a characteristic pattern of autonomic responses. It may, therefore, be possible for certain components of the autonomic nervous system to be activated without changes in the skin resistance. In the present experiment only 5% of the subjects showed overt fear during the GSRT without an increase in the magnitude of

the GSRs and only 1.5% of the subjects produced no measurable GSRs when showing overt fear.

5.2. Raw Scores

The scores of each subject on the PSES, the VSES, the SAS, the BAT and the GSRT are contained in Appendix One, Tables 1 - 10. The number of subjects giving affirmative answers to each item on the PSES, VSES and SAS are contained in Appendix Two, Tables 11 - 13, respectively.

5.3. Mean Scores

A summary of the 10 groups of subjects used in this experiment, the mean age of the subjects in each group, and the symbol of each group to be used in the text, is given in Table 1.

TABLE 1. Summary of Groups of Subjects

Group No.	Cultural Group	Mean Age	Symbol of Group
1	Xhosa	6.35	X1
2	Xhosa	10.40	X2
3	Xhosa	14.40	X3
4	Xhosa	20.00*	X4
5	Xhosa	42.75*	X5
6	White	6.75	W1
7	White	10.05	W2
8	White	14.10	W3
9	White	19.35	W4
10	White	40.70	W5

*Ages of subjects estimated by Xhosa interpreter.

5.31. PSES

The possible range of scores on the PSES is 0 - 10. Figures 4 - 8 illustrate the distribution of the scores for each group on this measure. An examination of these histograms reveals marked differences in the distribution of scores both across age groups and between Xhosa and White groups. From the distribution of the PSES scores there would seem to be a strong possibility of there being substantial differences between the mean PSES scores for a number of groups.

From Table 2 it will be seen that the means for the Xhosa groups show an increase with age. The mean for X5 is more than twice as great as the mean for X1. The age trend appears to be similar for the White groups, except for the mean for W5 which is slightly lower than the mean for W4.

TABLE 2. Mean PSES Scores

Group	Mean
X1	3.95
X2	4.15
X3	6.35
X4	7.95
X5	8.45
W1	2.40
W2	4.50
W3	4.70
W4	5.60
W5	5.35

The finding that mean PSES scores increase with age was predictable. Older boys, for example, are more likely to have opportunities of encountering snakes in the veld than a 6 year-old who is less adventurous and more

closely supervised by his parents. In the case of White subjects, several boys in W2 and W3 informed the Experimenter that they had been into the veld to catch snakes and some of them had kept a snake as a pet. None of the subjects in W1 reported any such activities. It was not unexpected that, in general, older subjects reported more intense aversive experiences of snakes than younger subjects.

The PSES means for X1, X3, X4 and X5 are higher than the means for the corresponding White groups. If the means for the Xhosa groups are significantly higher than the means for the corresponding White groups, some basis should exist for explaining possible differences between Xhosa and White subjects on the BAT and the GSRT, the two measures of the fear of snakes.

Figure 9 is a graph of the PSES means for the five Xhosa and the five White groups. This graph clearly shows the increase in PSES means with age and differences between the means for Xhosa and White groups.

The marked differences between a number of the PSES means makes an analysis of variance essential for determining whether these differences are statistically significant or not.

5.32. VSES

The VSES is very similar in structure to the PSES and both these scales were scored in the same way. The possible range of scores on the VSES is 0 - 10. A histogram for each age-group was constructed to illustrate the range of scores. Figures 10 - 14 suggest a number of marked differences between age-groups in VSES scores. Differences between the distribution of scores for groups X3, X4 and X5, and the corresponding White group, W3, W4 and W5, would appear to be less pronounced than in the case of the PSES.

TABLE 3. Mean VSES Scores

Group	Mean
X1	4.20
X2	5.70
X3	6.00
X4	7.60
X5	7.60
W1	5.05
W2	6.20
W3	5.90
W4	6.90
W5	6.05

From Table 3 it will be seen that for the Xhosa groups 1 - 4 there is an increase in the VSES means, with X4 and X5 having identical means. The age trend is not as consistent for the White groups. The mean for W3 is lower than the mean for W2, and the mean for W5 is lower than the mean for W4. The age trend is not nearly as distinct as that found for the PSES means. The difference between the highest and the lowest VSES means, for both Xhosa and White groups, is considerably smaller than the differences between the highest and lowest PSES means. There are, however, a number of substantial differences between the VSES means of adjacent age-groups, e.g. X1 and X2, and between Xhosa and White groups, e.g. X5 and W5. An analysis of variance would establish whether significant differences exist between the VSES means for age- and cultural-groups.

Unlike the PSES means, the differences between the VSES means for corresponding Xhosa and White groups are relatively small. On the whole, the means for Xhosa groups are higher than the means for the corresponding White groups. It is essential that the significance of these differences

be statistically tested.

Figure 15 is a graph of the VSES means.

5.33. SAS

The possible range of scores on the SAS is 0 - 20. From Figures 16 - 20 there appears to be very marked differences in the distribution of the scores, particularly between corresponding Xhosa and White groups. The differences in the distribution of the SAS scores for Xhosa and White groups seem to increase with age. For example, in X5, 15 out of 20 subjects scored 15 or more, while only two subjects scored more than 15 in W5. In W1, 12 subjects scored 15 or more, while in X1, 10 subjects scored 15 or more.

For the five Xhosa groups, the SAS means indicate a relatively consistent negative attitude towards snakes. Attitudes towards snakes were most negative in X2. For the White groups there is a dramatic change in attitudes between W2 and W3. The means for W3, W4 and W5 are considerably lower than the means for W1 and W2. The attitudes towards snakes held by Whites appear to become considerably more positive between the ages of 11 years - 14 years.

TABLE 4. Mean SAS Scores

Group	Mean
X1	15.30
X2	18.20
X3	15.40
X4	17.40
X5	16.10
W1	14.35
W2	14.70
W3	8.25
W4	10.15
W5	7.85

The SAS means for the White groups are all lower than the means for the Xhosa groups. Except for W1 and X1, the differences between the corresponding Xhosa and White groups' means are considerable. These differences are clearly portrayed in Figure 21, a graph of the means.

The relatively consistent differences between SAS means for Xhosa and White groups and the dramatic change in attitudes between the White groups makes an analysis of variance of the SAS means imperative.

5.34. BAT

The method of scoring the BAT was described in Chapter 4. The higher the BAT score, the less intense is the fear of snakes. The possible range of scores on this test is 0 - 20.

The distribution of the BAT scores for each group is illustrated in Figures 22 - 26. The differences in the distribution of the scores are most noticeable between X4 and W4, and X5 and W5. The number of subjects in each group who were prepared to touch the snake with a bare hand was as follows : X1, 12; W1, 9; X2, 15; W2, 10; X3, 14; W3, 16; X4, 4; W4, 15; X5, 10; W5, 13. Only relatively small numbers of subjects in each group completed the BAT. The highest number was seven subjects in W3, while only one subject completed the BAT in W2 and X4. Subjects, on the whole, exhibited remarkably cautious behaviour towards a live snake.

Table 5 presents the BAT means for each group. For the White groups, the largest change in BAT means occurred between W2 and W3. The means for W1 and W2 are considerably lower than the means for the three older White groups. The largest difference between Xhosa means is to be found between X3 and X4. An interesting difference in age trend is apparent. While the BAT means for the White group indicate a decrease in the fear of snakes with age (i.e. until 16 years), the BAT means for the Xhosa groups show an increase in the fear of snakes for the two older age groups (X4 and X5).

TABLE 5. Mean BAT Scores

Group	Mean
X1	12.85
X2	14.45
X3	14.30
X4	9.60
X5	11.79
W1	11.20
W2	11.30
W3	16.20
W4	15.25
W5	14.45

The BAT means are relatively similar for the first three Xhosa and White groups. There is, however, a large difference between the means for X4 and W4. The difference between X5 and W5 is almost the same as the difference between X3 and W3.

Figure 27 is a graph of the BAT means.

As in the case of the three previous measures, there are a number of marked differences between BAT means. These differences exist both between age-groups and between some of the corresponding Xhosa and White groups. Further analysis of the data is essential. An appropriate first-step in this further analysis would be an analysis of variance of the mean scores. An analysis of variance would determine whether there is one or more significant differences between the five age-groups for both Xhosa and White subjects and whether there is a significant difference between the combined BAT means for the White groups and the combined BAT means for the Xhosa groups.

5.35. GSRT

The method of scoring the GSRT was described in detail in Chapter 4. A single GSRT value was obtained by taking the percentage increase between the largest GSR occurring before Step 5 and the largest GSR occurring from Step 5 onwards. Of the 200 subjects, a GSRT score was not obtained for six subjects who either refused to undergo the test (one subject) or else insisted on the test being terminated before the completion of the first five steps (five subjects). Three of these subjects were Whites and three were Xhosas. A further six subjects insisted on the GSRT being terminated after the completion of the 9th. step. Scores for these subjects have been included in the data.

The distribution of the GSRT scores are illustrated in Figures 28 - 32. The scores ranged from a 0% increase to a 391% increase. The least inter-subject variation occurred in X2, where the highest score was 107.07%. There are a number of marked variations in the distribution of GSRT scores between adjacent age-groups, e.g. W2 and W3, and between corresponding Xhosa and White groups, e.g. X1 and W1.

From Table 6 it will be seen that the mean percentage increases in GSRs are relatively similar for X1, X2, X3 and X5. The mean for X4 is considerably higher than the other four means. This is an extremely interesting finding in view of the BAT mean for X4. Both on the BAT and the GSRT, subjects in X4 showed greater fear than the other four groups.

The lowest GSRT mean for White groups is the mean for W3. This group also showed the least fear on the BAT. However, the GSRT mean for W3 is only very slightly lower than the means for W4 and W5.

TABLE 6. Mean GSRT Scores

Group	Means
X1	51.48
X2	42.59
X3	58.55
X4	80.19
X5	43.02
W1	54.27
W2	67.21
W3	45.41
W4	47.77
W5	48.49

An analysis of variance is essential to determine whether there are significant differences between the GSRT means. This would also permit a comparison to be made with the differences between the BAT means. It is of importance to determine whether both the measures of fear revealed significant differences between age-groups and between corresponding Xhosa and White groups.

In addition to calculating the percentage increase in GSRs, the magnitude of the GSRs for each subject were ranked from highest to lowest. Table 7 contains the percentage of subjects who responded with the highest GSR, the second-highest GSR and the third-highest GSR to each step of the GSRT. If subjects, who are afraid of snakes, become progressively more fearful during the GSRT, then it would be expected that Step 10 would produce the highest GSR, Step 9 the second-highest GSR, and Step 8 the third-highest GSR. Step 1, where the snake is positioned furthest away from the subject, should produce the smallest GSR. If the

subject is completely unafraid of the snake, then one would not expect a progressive increase in GSRs.

TABLE 7. Percentage of Subjects Responding with the Highest, Second-Highest and Third-Highest GSRs to Each Step of the GSRT

Step	Highest GSR	2nd Highest GSR	3rd Highest GSR
10	59.36	21.93	9.10
9	10.68	38.50	16.04
8	5.34	18.18	17.65
7	3.70	5.34	27.81
6	0.54	2.65	5.35
5	2.65	6.42	8.56
4	9.10	3.21	2.14
3	4.26	0.50	5.88
2	2.65	1.60	6.42
1	1.60	1.60	1.06

Data for Ss who insisted on GSRT being terminated after the 9th. step has been included in the table.

From Table 7 it will be seen that the final step of the GSRT was clearly the most effective in producing the highest GSR. The second-highest GSRs were most frequently produced by Step 9. The third-highest GSRs were produced when the Experimenter placed his hand 1 inch from the snake's head (Step 7). It is difficult to suggest an explanation for the finding that Step 7 was more effective than Step 8 in producing the third-highest GSRs. A higher percentage of subjects responded with the highest and the second-highest GSR to Step 8 than to Step 7.

It is interesting to note that Step 4 was more effective in producing the highest GSR than Steps 5, 6, 7 and 8. It is quite apparent from Table 7

that a number of subjects produced GSRs of decreasing magnitude during the test. The performance of these subjects on the other measures will be discussed in Section 5.4. If the instructions for the GSRT had induced fear, this should have been reflected in the GSRs for the first step. From the results for Step 1 this clearly did not happen. There appears to be no easy explanation for the effectiveness of Step 4 in producing higher GSRs than Steps 5 - 8. Having the snake pushed within 24 ins. of the subject appears to have been more fear-invoking than the Experimenter touching the snake, but not the Experimenter lifting the snake.

5.36. Scores of Subjects Scoring 0 on the PSES

A number of subjects claimed that they had never seen a live snake before, i.e. scored 0 on the PSES. Does this result in less or greater fear being shown towards the snake? Five subjects in X1 and seven subjects in X2 scored 0 on the PSES. The performance of these subjects on the other measures is shown in Table 8 and Table 9, respectively. Only four of the 100 White subjects claimed that they had never seen a live snake before the testing.

TABLE 8. Performance of Subjects in X1 Scoring 0 on the PSES

Subject No.	VSES	SAS	BAT	GSRT
7	6	18	15	2.91
8	9	6	2	17.27
10	4	20	20	0.00
12	0	14	9	0.00
19	6	16	3	121.82
Means	5.00	14.80	9.80	28.40
Means of other Ss	4.33	15.47	13.86	59.16

TABLE 9. Performance of Subjects in X2 Scoring 0 on the PSES

Subject No.	VSES	SAS	BAT	GSRT
23	4	20	13	42.84
26	6	20	18	81.21
29	6	14	15	86.93
32	6	20	3	76.31
35	4	20	20	18.79
36	6	20	15	46.19
38	6	18	5	100.12
Means	5.43	18.86	12.71	64.63
Means of other Ss	5.85	17.85	15.38	30.73

The significance of the differences between the means in Tables 8 and 9 was not statistically tested because of the small number of subjects involved. The mean scores of the subjects scoring 0 and more than 0 on the PSES are very similar for the VSES and SAS. Subjects in X1 who had never seen a live snake before showed more fear on the BAT and less fear on the GSRT than the other subjects in X1 who had seen a live snake before testing. In X2 subjects scoring 0 on the PSES showed more fear on both the BAT and the GSRT than subjects scoring one or more on the PSES. It is interesting to note that of the 12 subjects in Tables 8 and 9, six of the subjects were prepared to touch the snake with a bare hand and two of the subjects completed the BAT. Five of these subjects produced a less than 20% increase in GSRs during the GSRT. The fact of having never seen a live snake before did not seem to predispose subjects to show an unusually intense fear of snakes.

5.37. Performance of Subjects Claiming No Aversive Experiences of Snakes

Four Xhosa subjects, three in X1 and one in X3, scored two or

less on the PSES and zero on the VSES, i.e. they claimed no aversive experiences with snakes. The scores of these subjects on the SAS, BAT and GSRT are given in Table 10.

TABLE 10. Performance of Subjects Claiming No Aversive Experiences of Snakes

Subject No.	SAS	BAT	GSRT
3	12	3	37.76
5	14	20	55.60
12	14	9	0.00
42	18	20	107.07
Means	14.5	13.0	50.11

The scores of the subjects reporting no aversive experiences of snakes appear very similar to the mean scores of X1 and X3. The number of subjects included in Table 10 is far too small to permit any definite statement on the role of aversive experiences in the fear of snakes. However, the apparent failure of the lack of aversive experiences to influence the fear of snakes is extremely interesting and possibly merits further investigation.

FIG. 4. DISTRIBUTION OF PSES SCORES FOR GROUP 1.

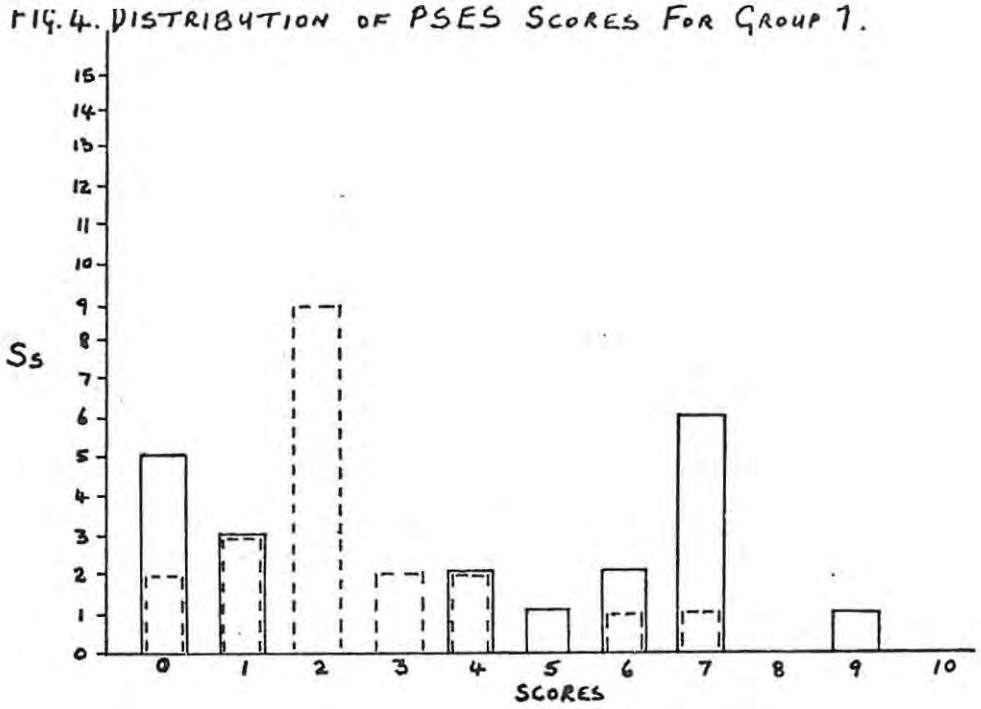


FIG. 5. DISTRIBUTION OF PSES SCORES FOR GROUP 2.

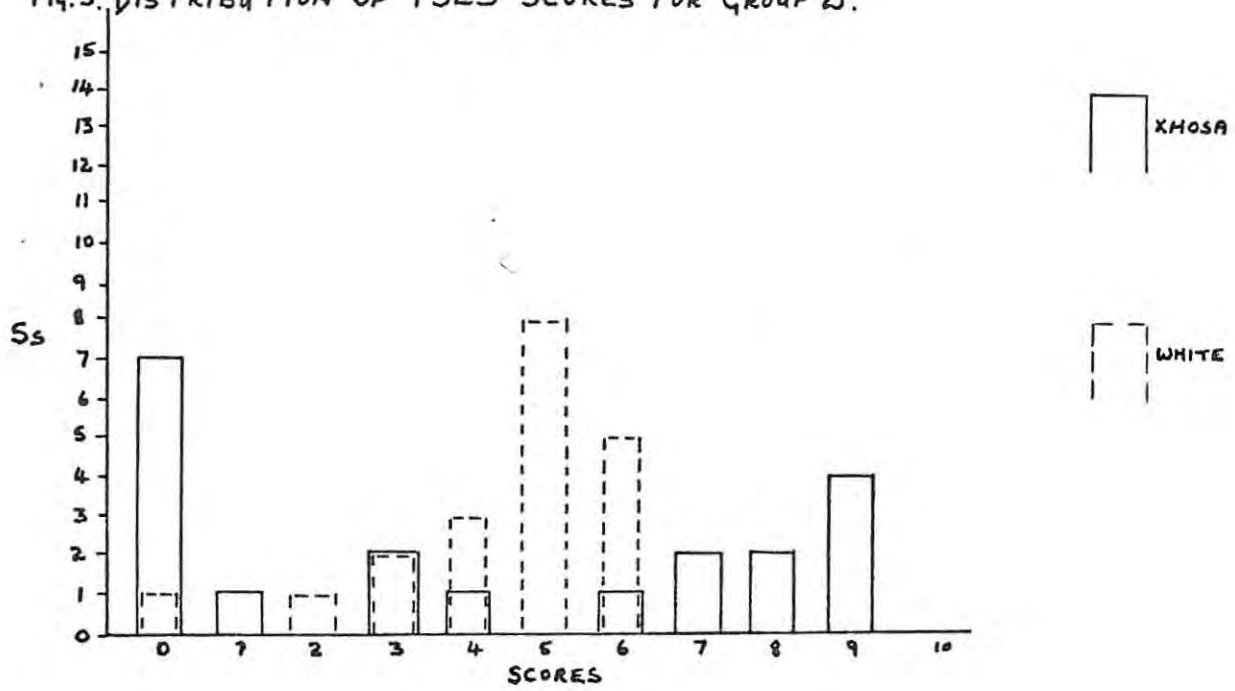


FIG. 6. DISTRIBUTION OF PSES SCORES FOR GROUP 3.

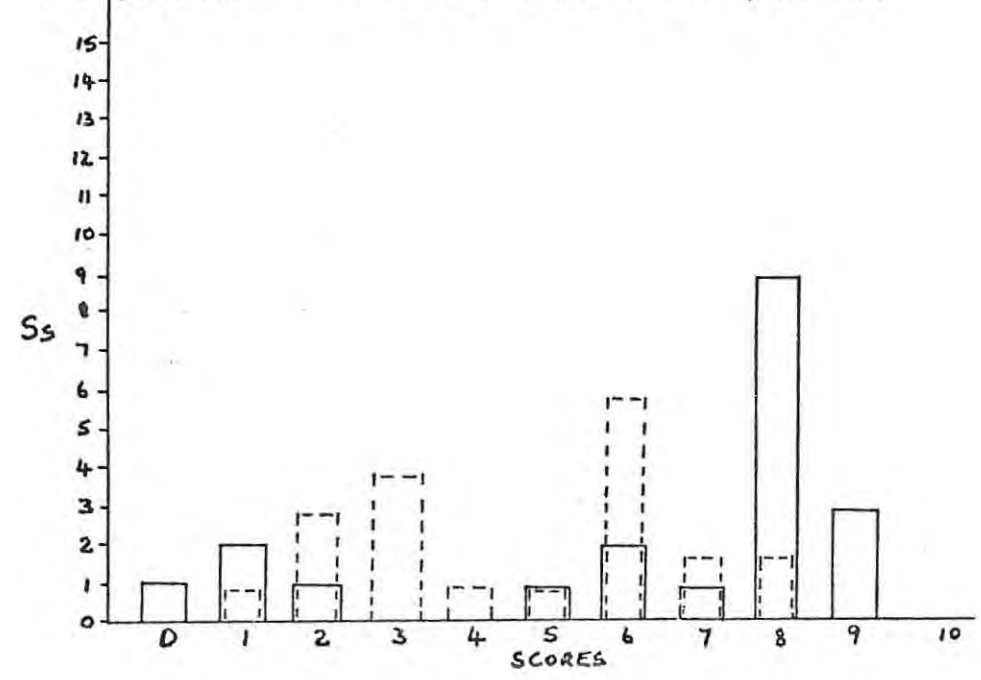


FIG.7. DISTRIBUTION OF PSES SCORES FOR GROUP 4.

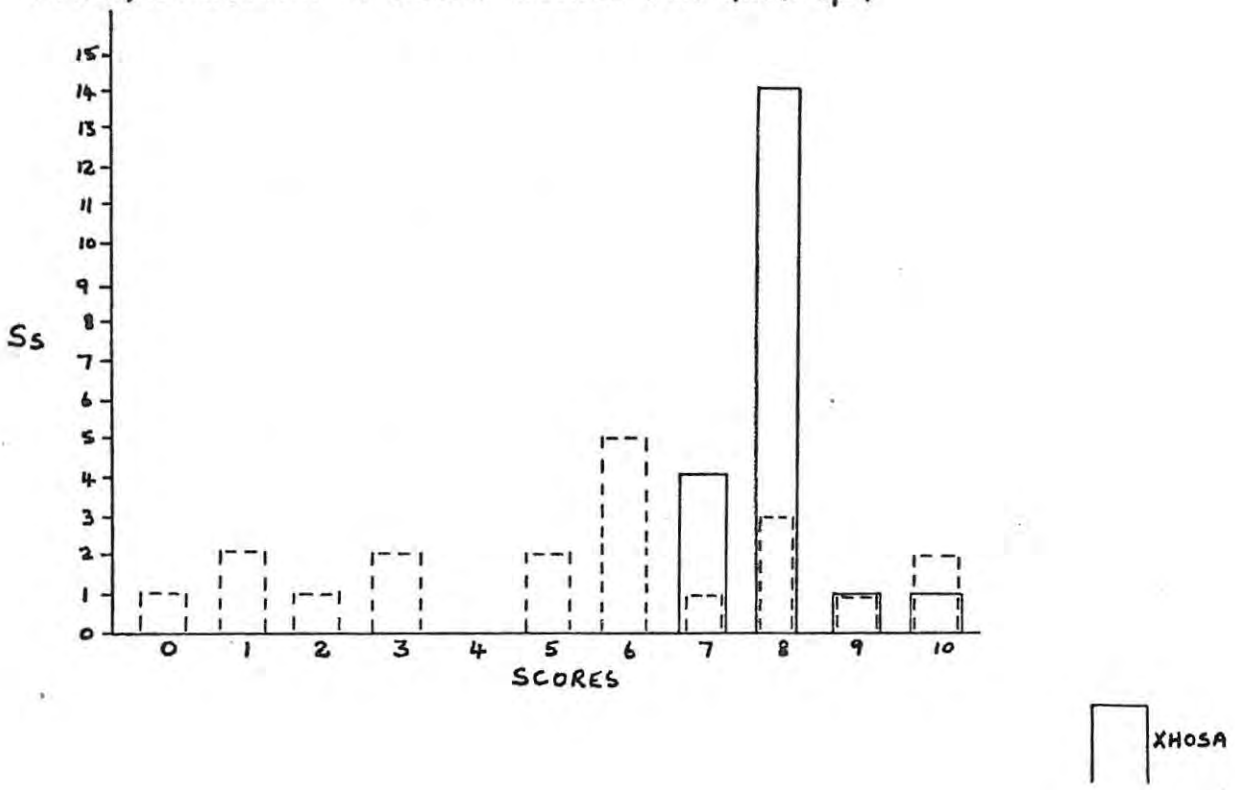


FIG.8 DISTRIBUTION OF PSES SCORES FOR GROUP 5.

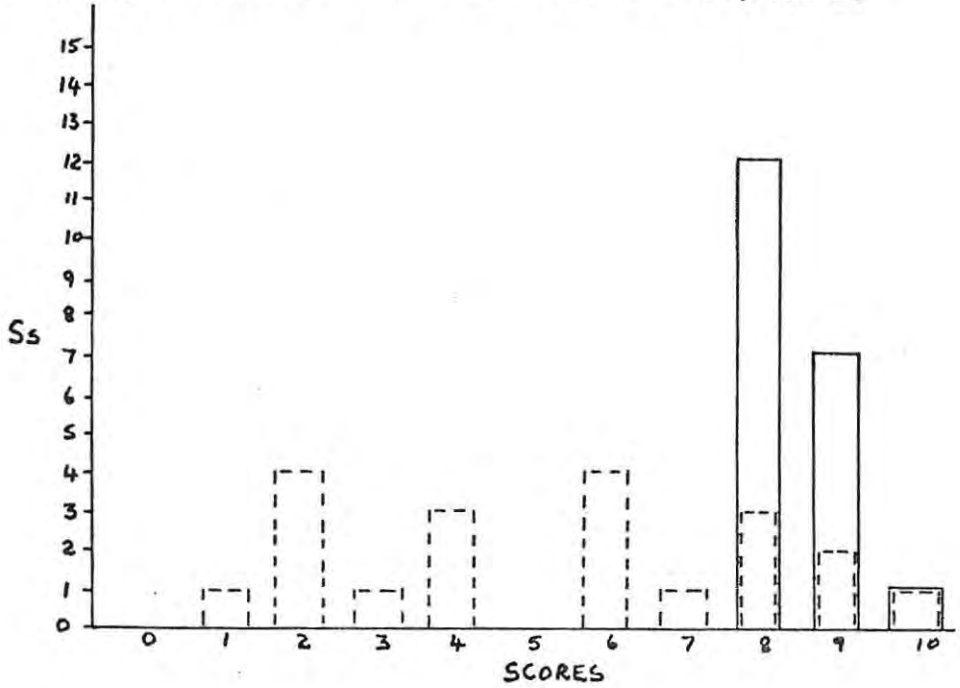


FIG. 9. PSES MEANS FOR XHOSA AND WHITE GROUPS.

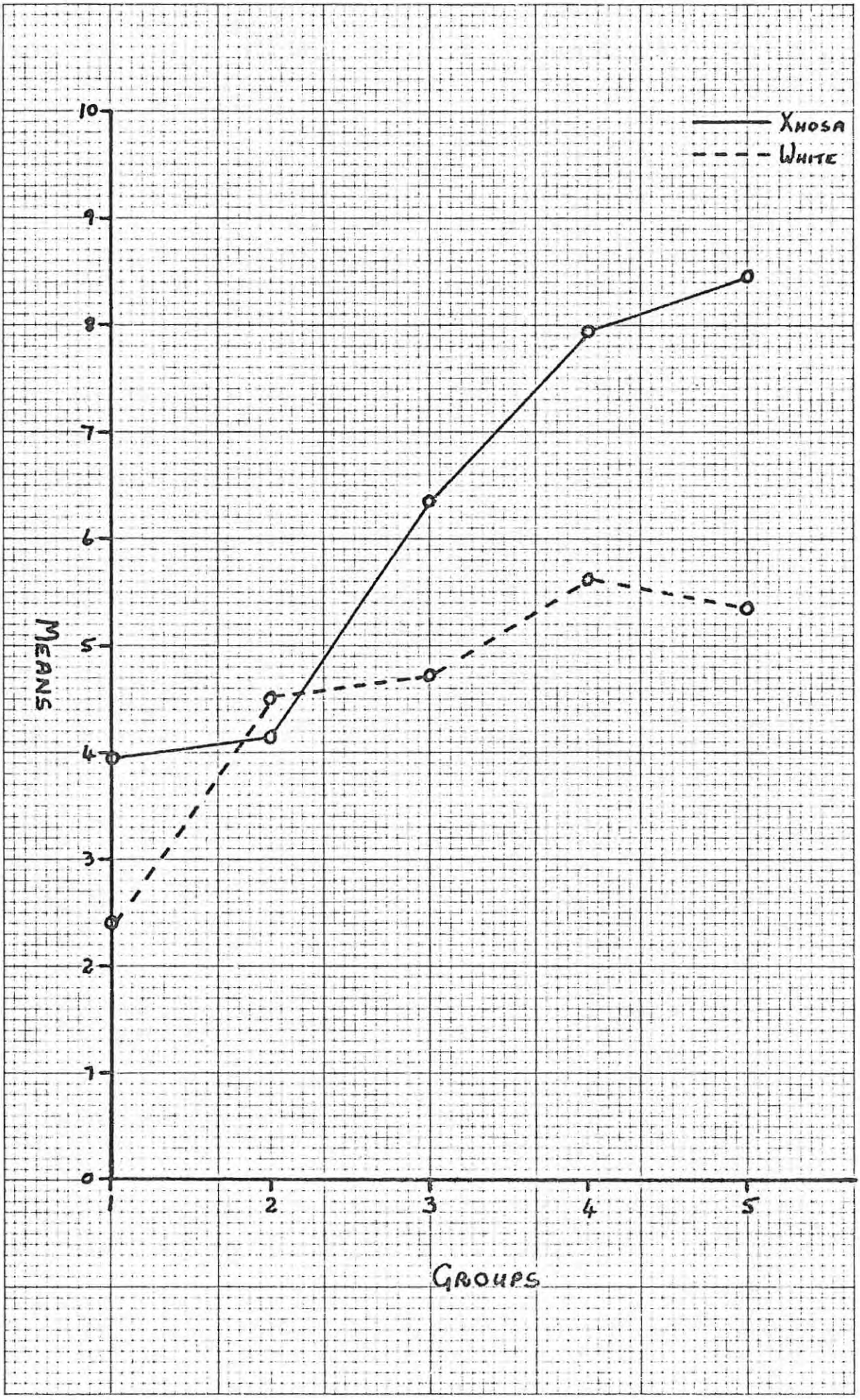


FIG. 10. DISTRIBUTION OF VSES SCORES FOR GROUP 1.

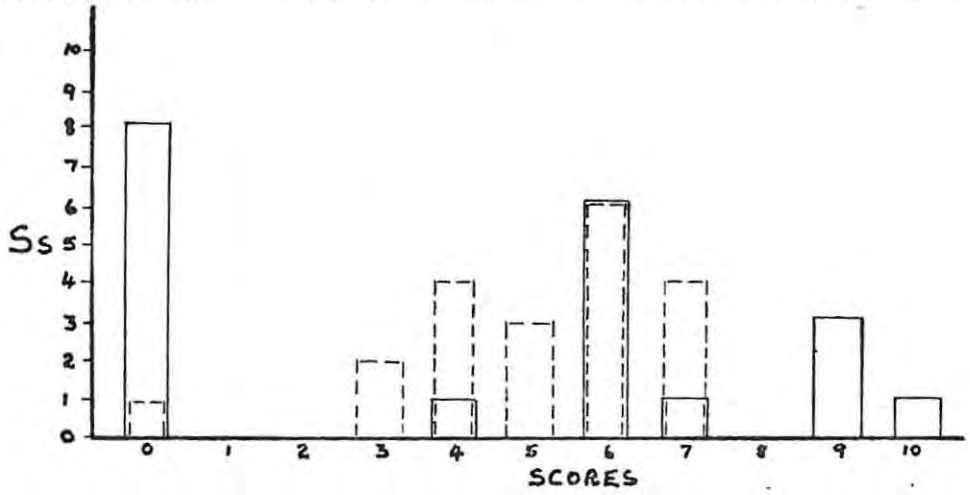


FIG. 11. DISTRIBUTION OF VSES SCORES FOR GROUP 2.

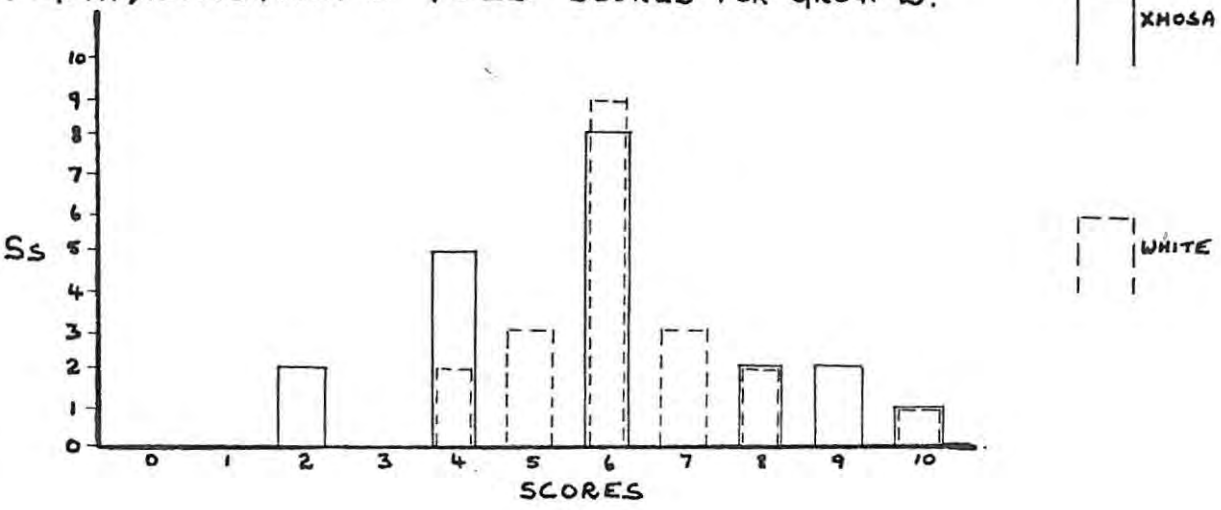


FIG. 12. DISTRIBUTION OF VSES SCORES FOR GROUP 3.

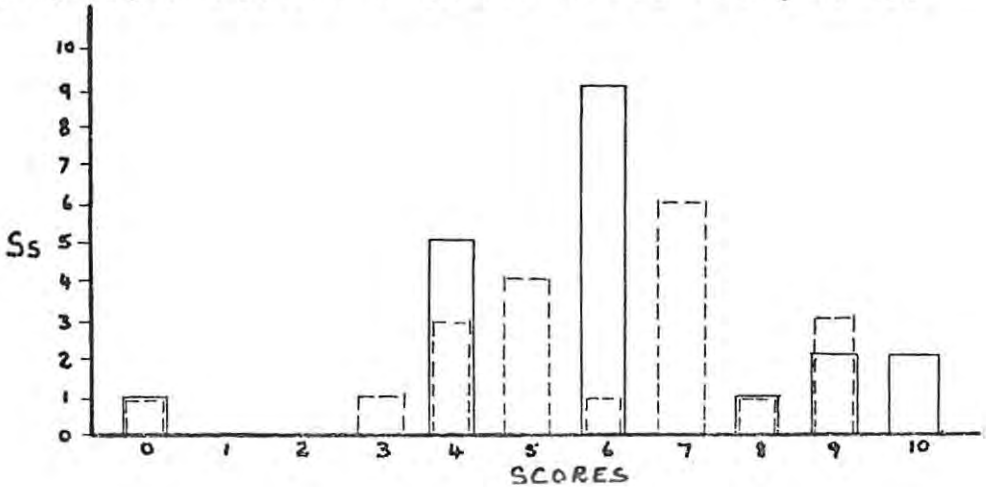


FIG. 13. DISTRIBUTION OF VSES SCORES FOR GROUP 4.

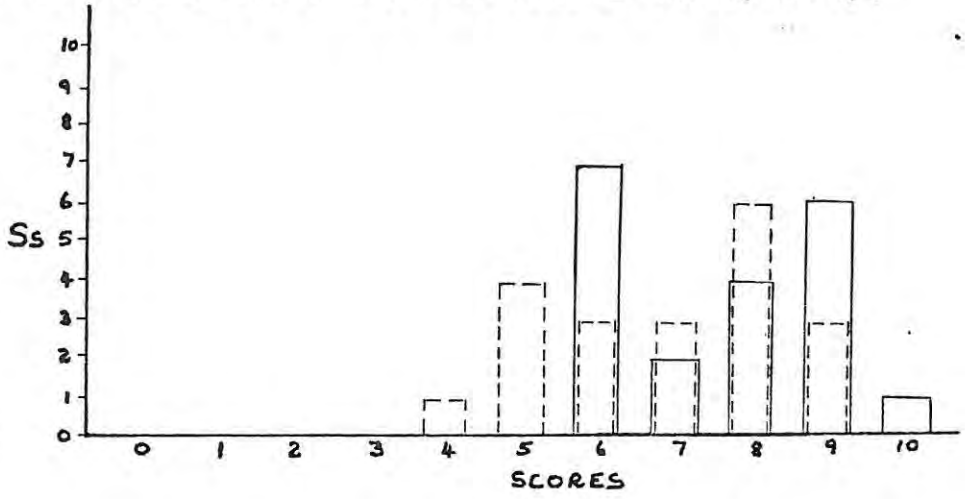


FIG. 14. DISTRIBUTION OF VSES SCORES FOR GROUP 5.

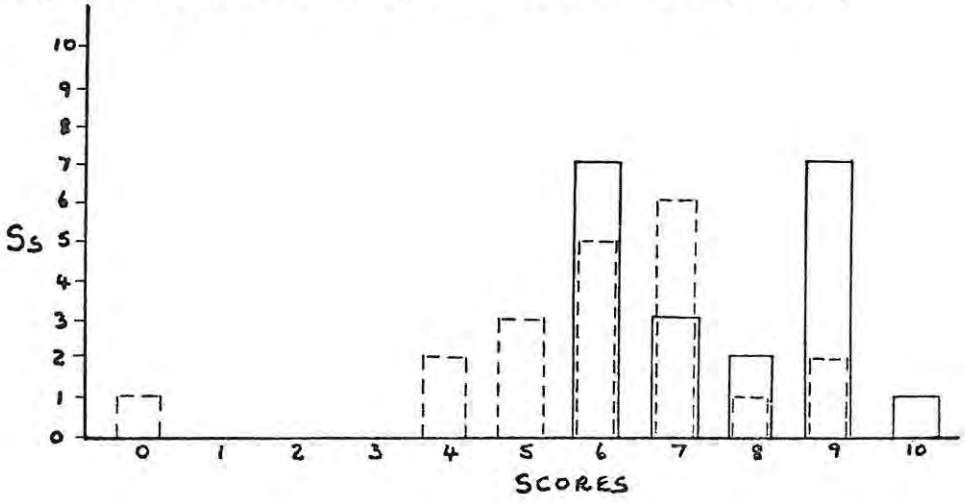


FIG. 15. VSES MEANS FOR XHOSA AND WHITE GROUPS.

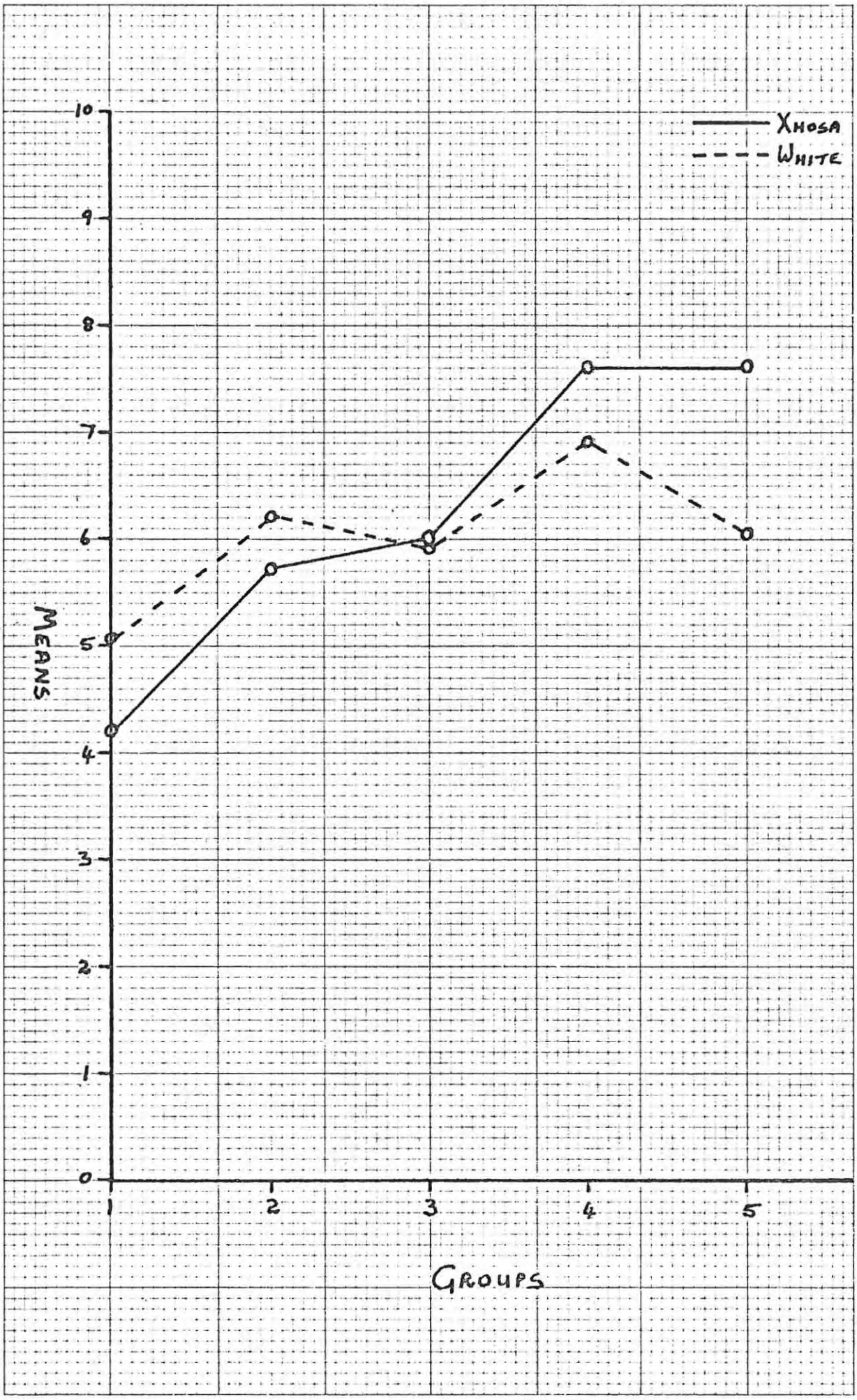


FIG. 16. DISTRIBUTION OF SAS SCORES FOR GROUP 1.

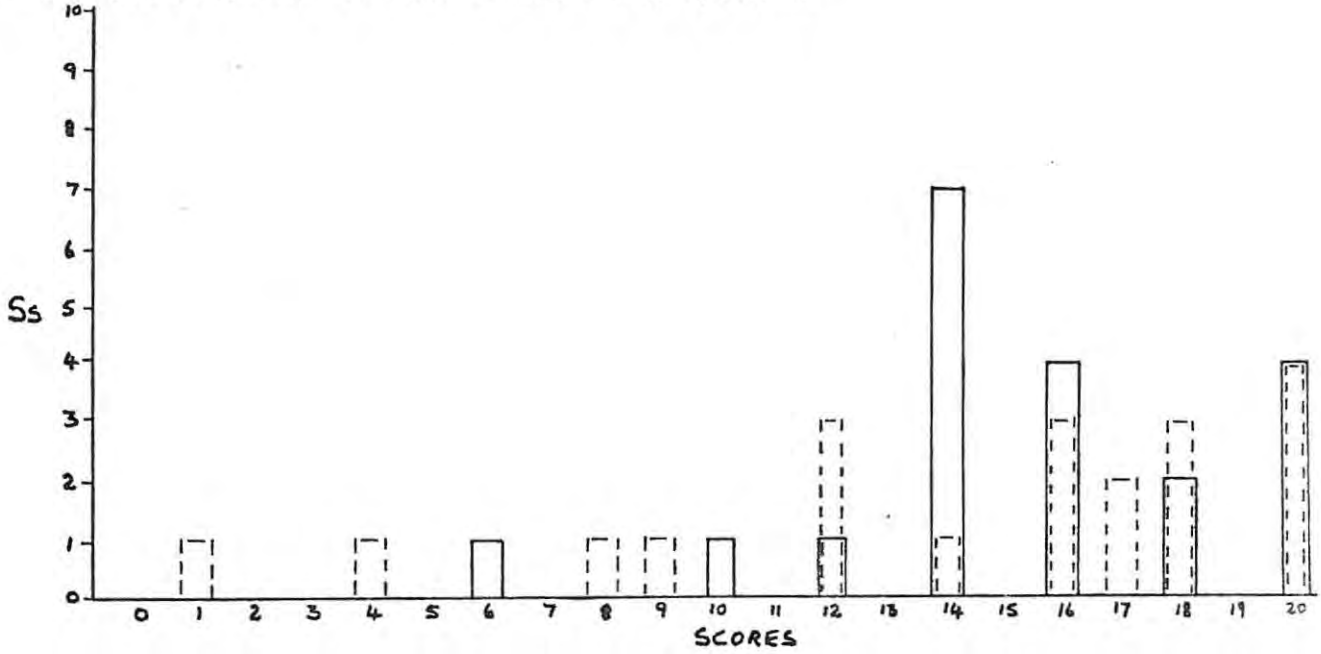


FIG. 17. DISTRIBUTION OF SAS SCORES FOR GROUP 2.

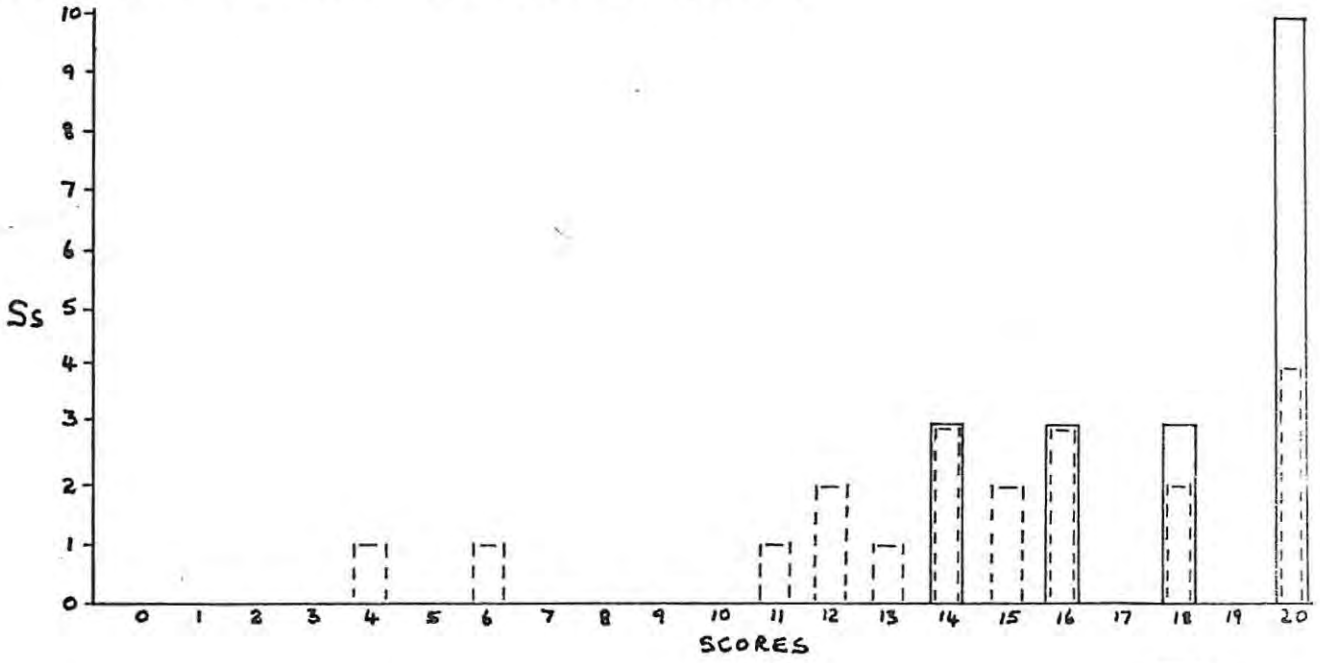


FIG. 18. DISTRIBUTION OF SAS SCORES FOR GROUP 3.

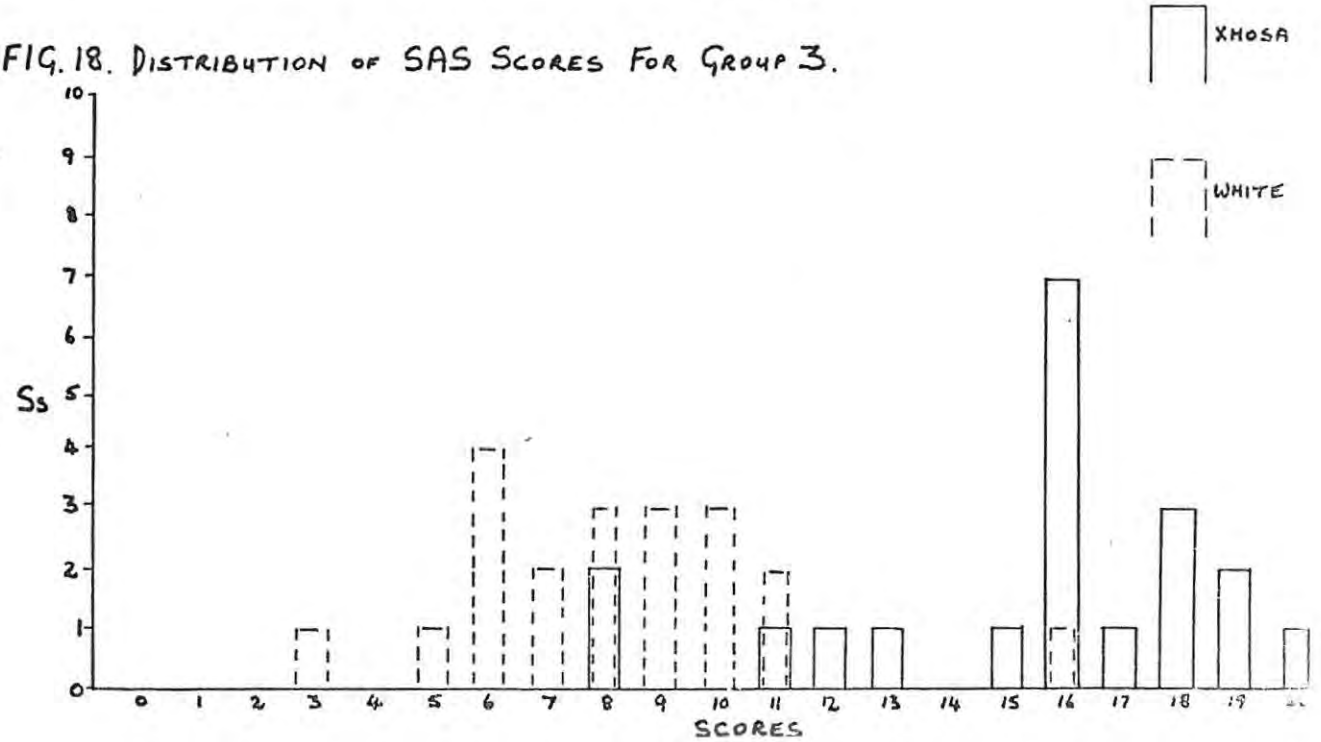


FIG. 19. DISTRIBUTION OF SAS SCORES FOR GROUP 4.

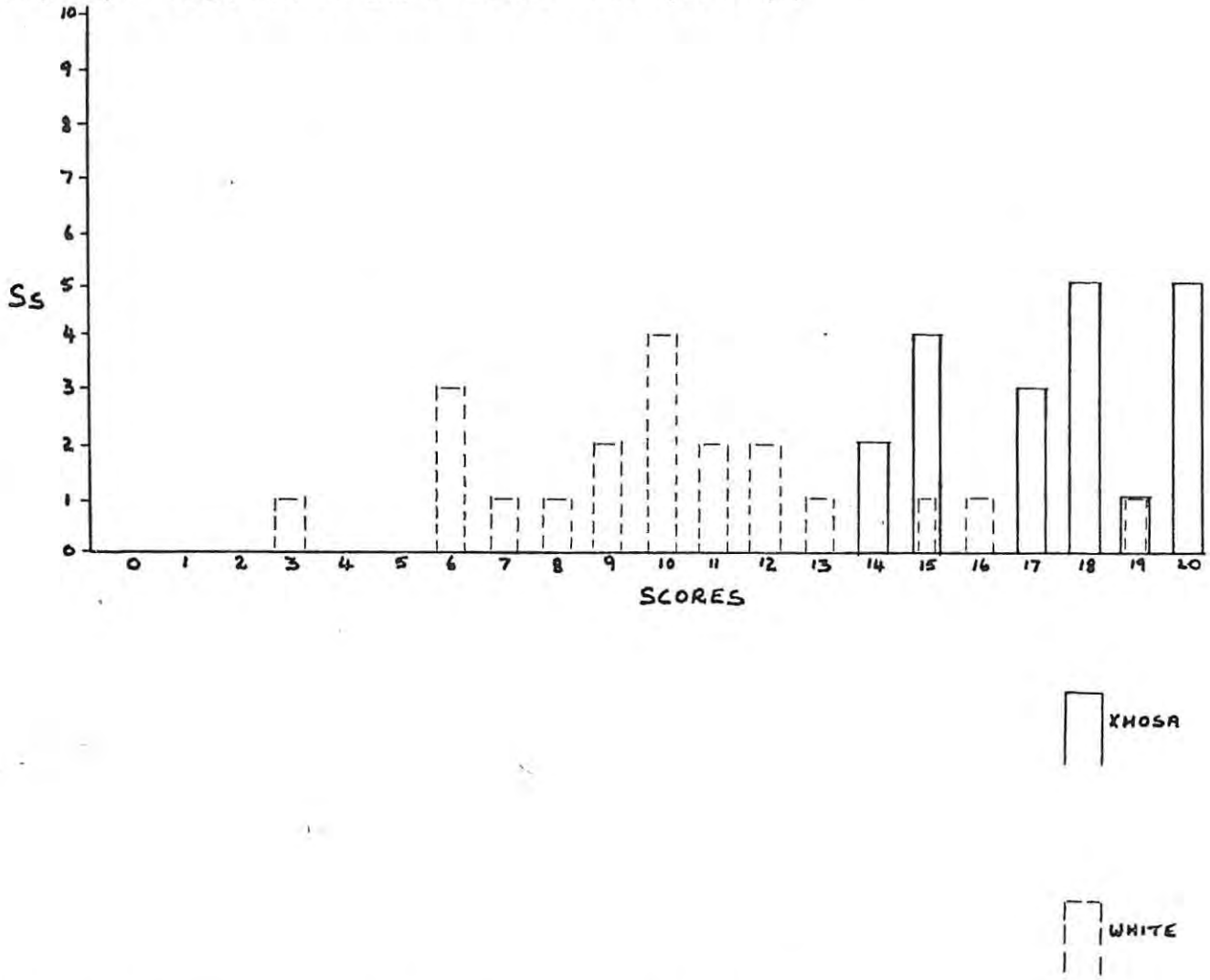


FIG. 20. DISTRIBUTION OF SAS SCORES FOR GROUP 5.

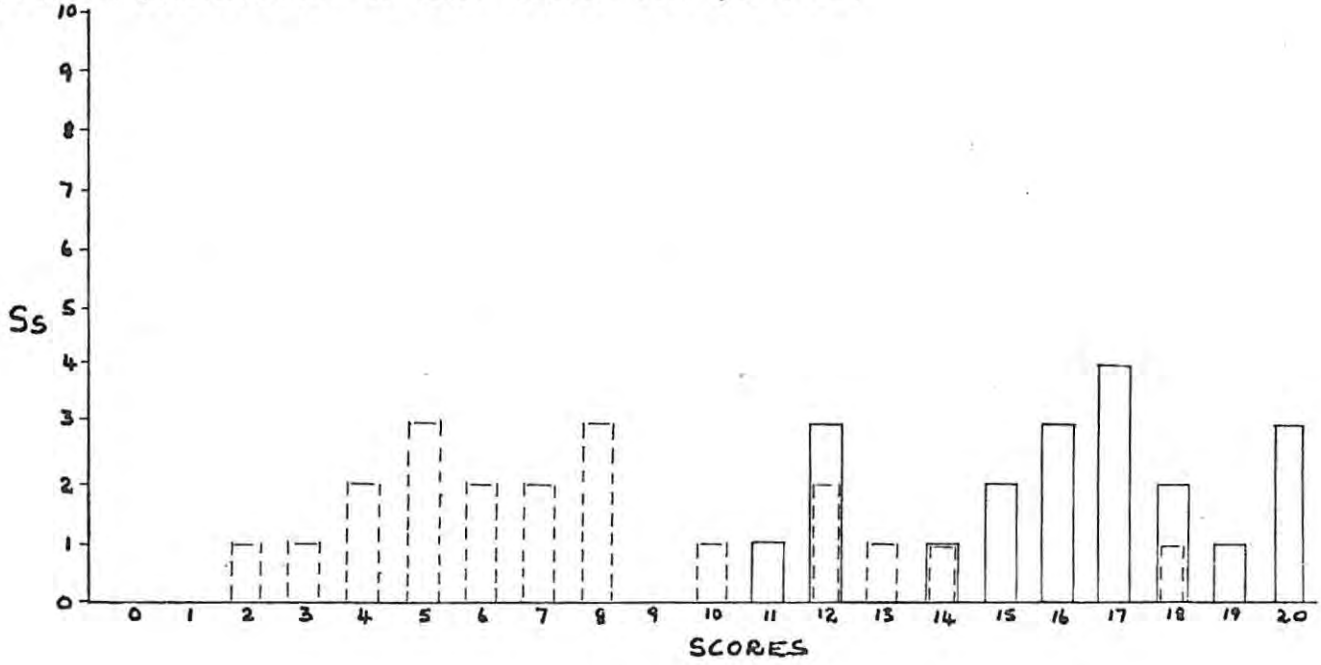


FIG. 21. SAS MEANS FOR XHOSA AND WHITE GROUPS.

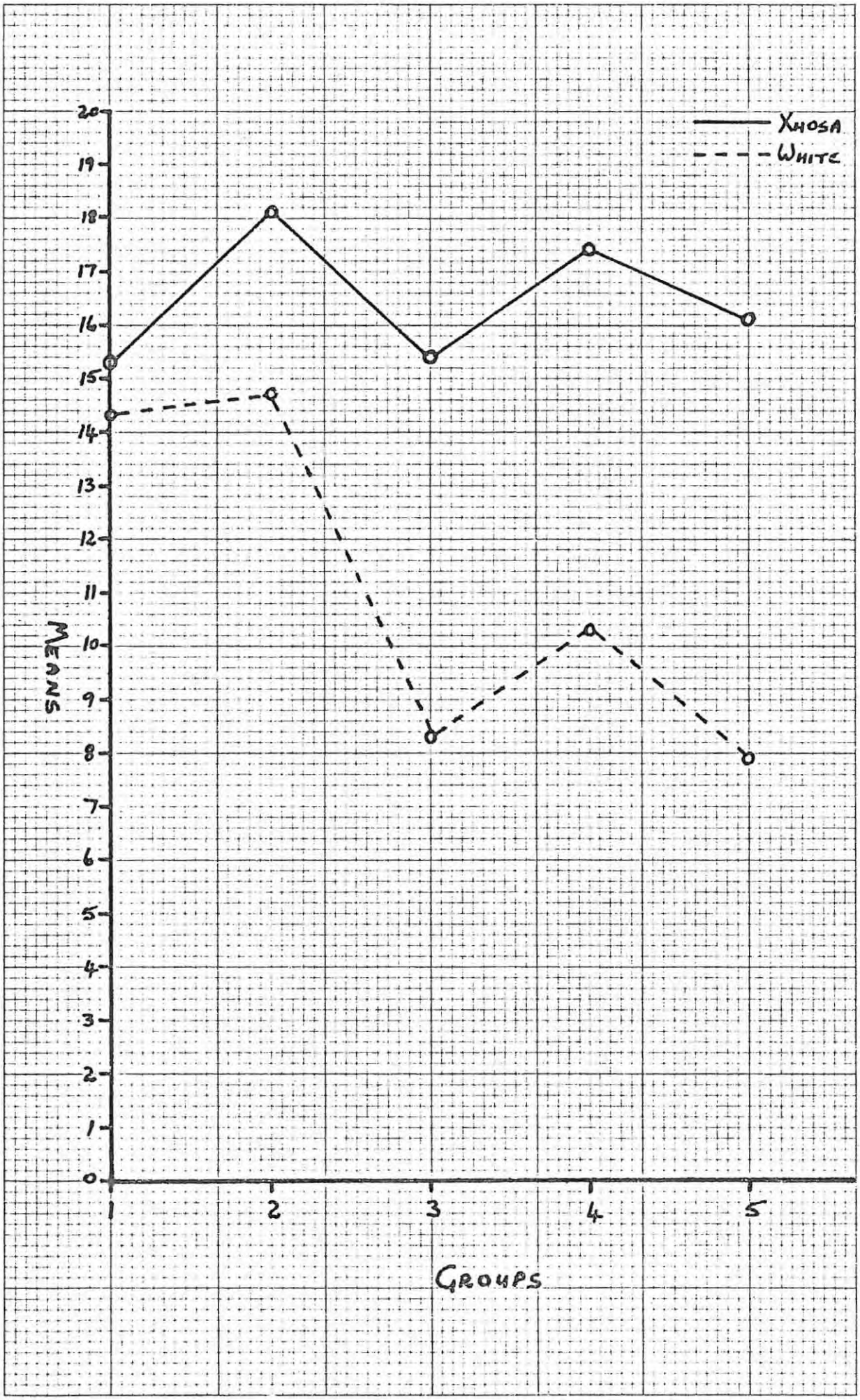


FIG. 22. DISTRIBUTION OF BAT SCORES FOR GROUP 1.

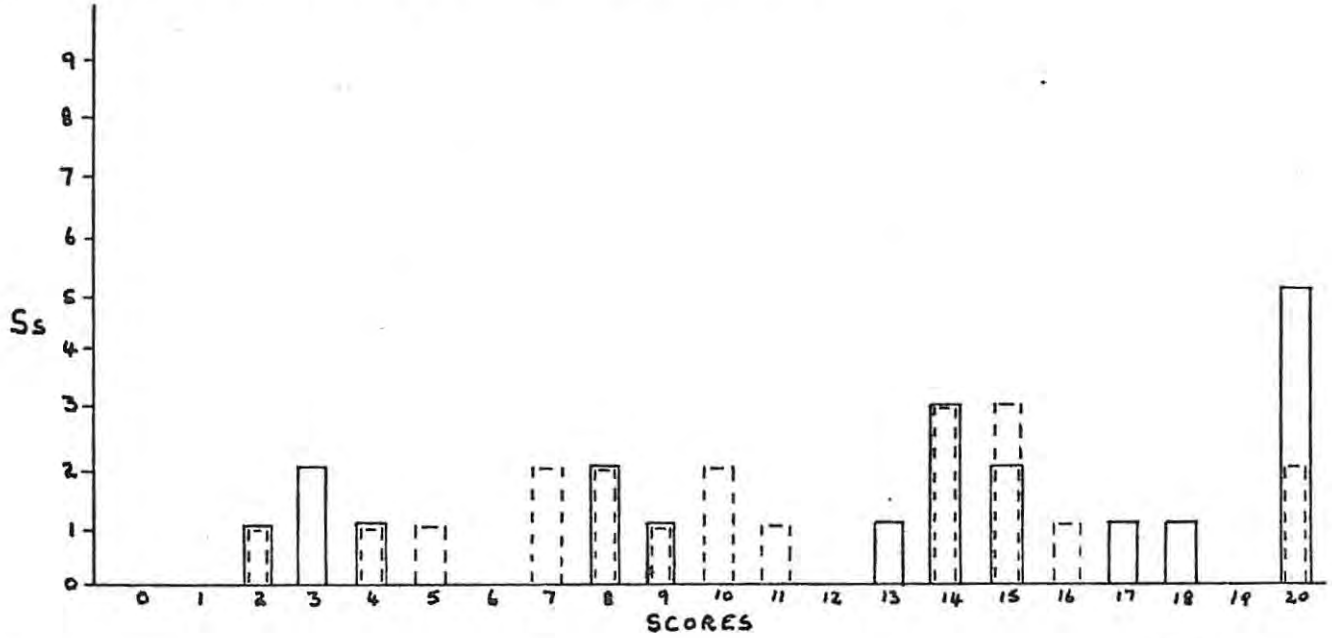


FIG. 23. DISTRIBUTION OF BAT SCORES FOR GROUP 2.

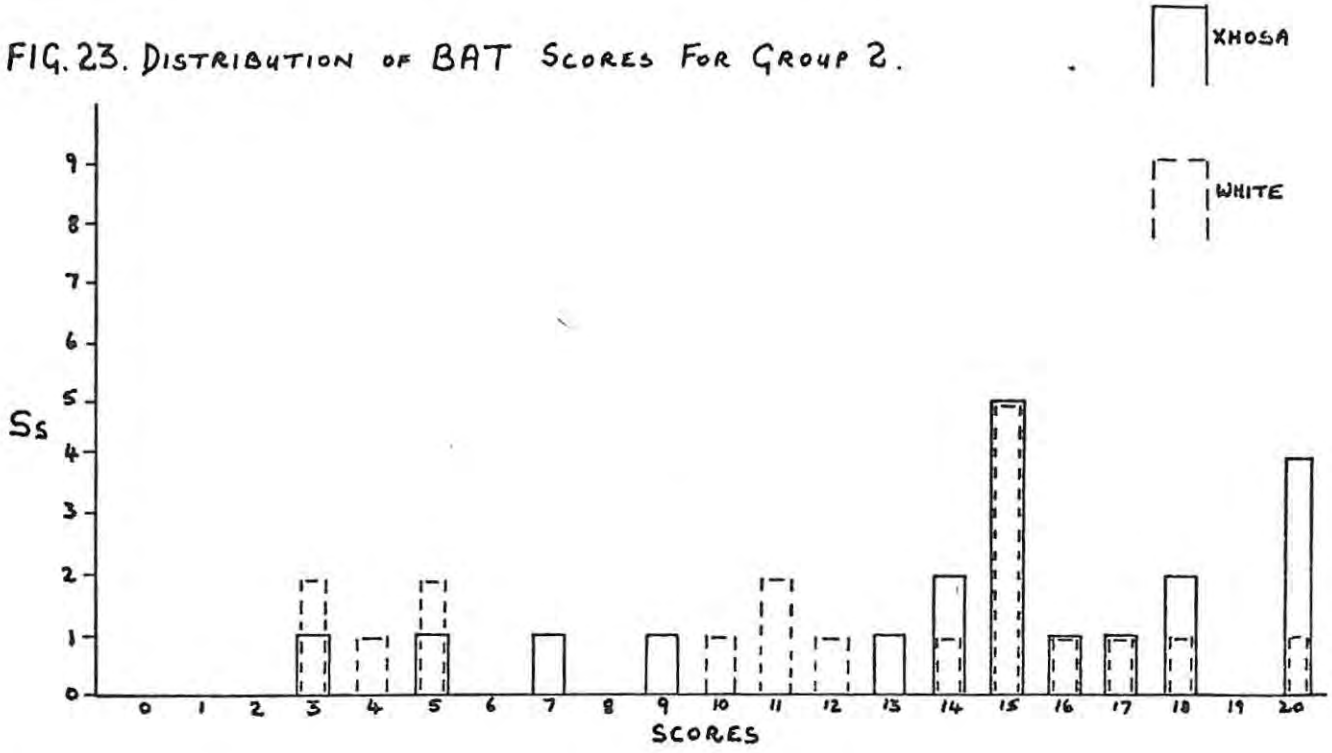


FIG. 24. DISTRIBUTION OF BAT SCORES FOR GROUP 3.

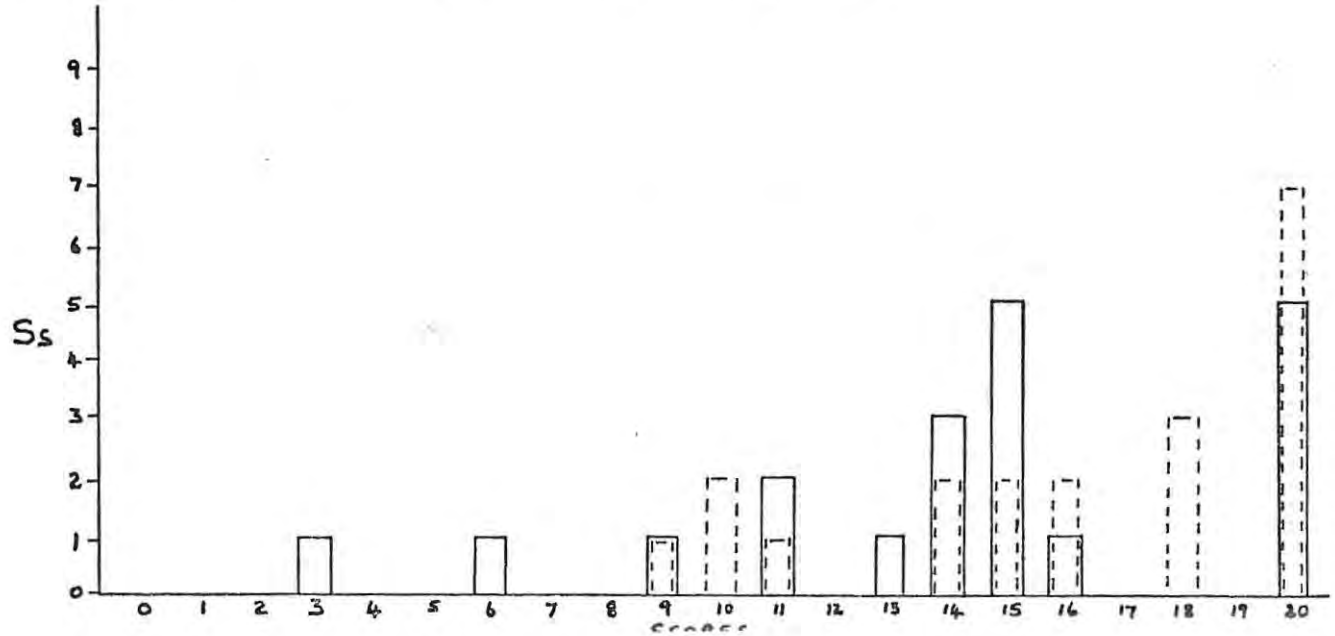


FIG. 25. DISTRIBUTION OF BAT SCORES FOR GROUP 4.

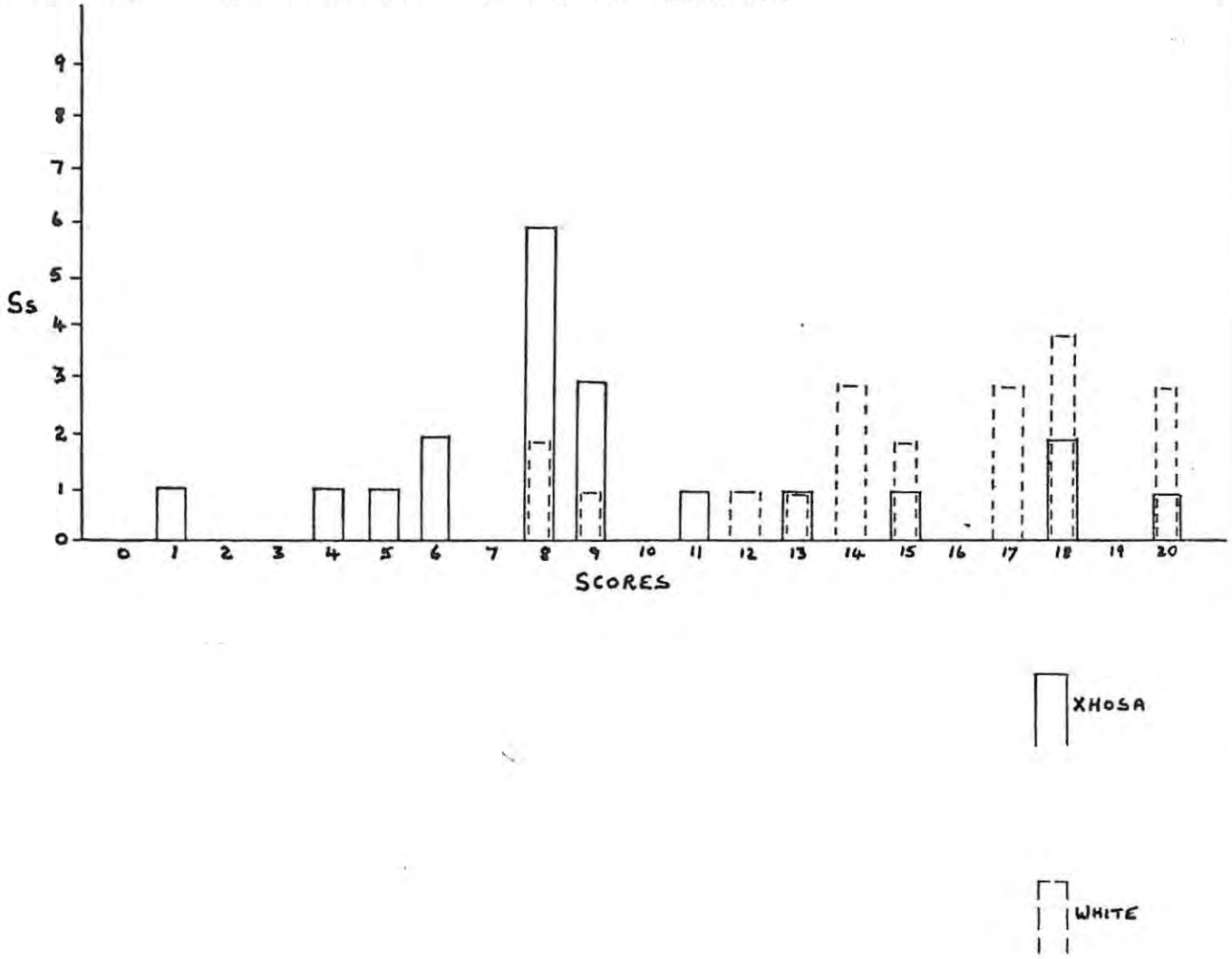


FIG. 26. DISTRIBUTION OF BAT SCORES FOR GROUP 5.

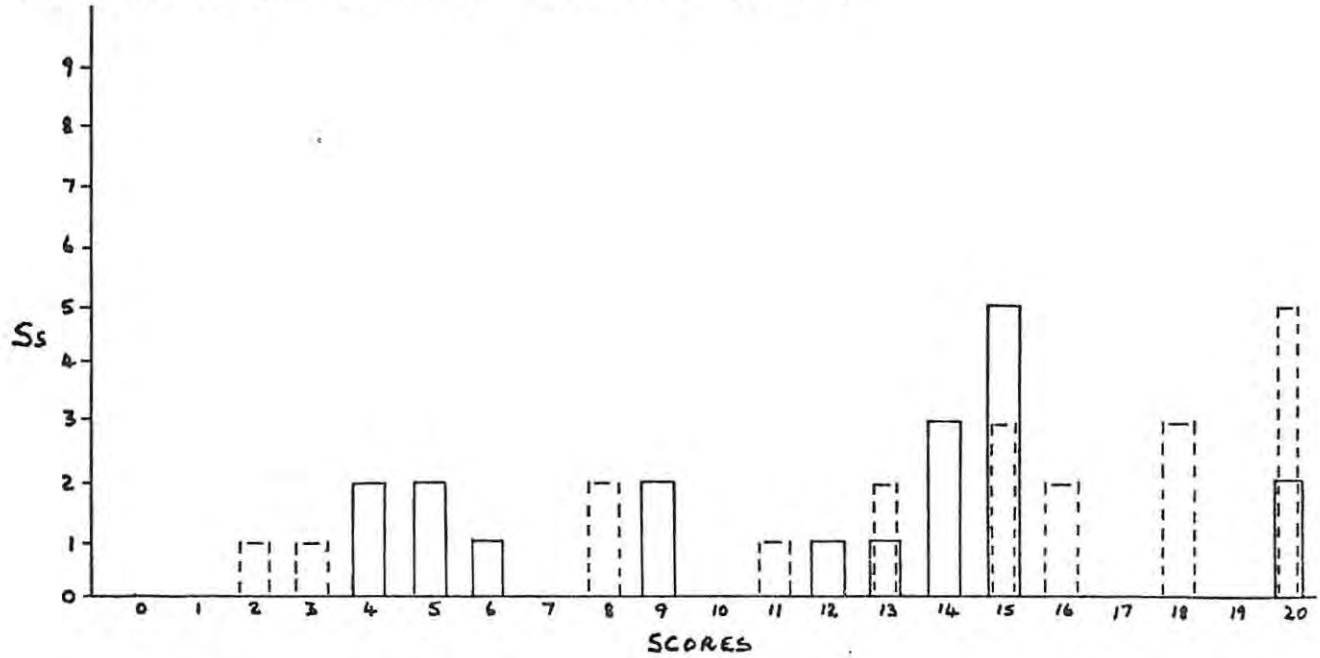


FIG. 27. BAT MEANS FOR XHOSA AND WHITE GROUPS.

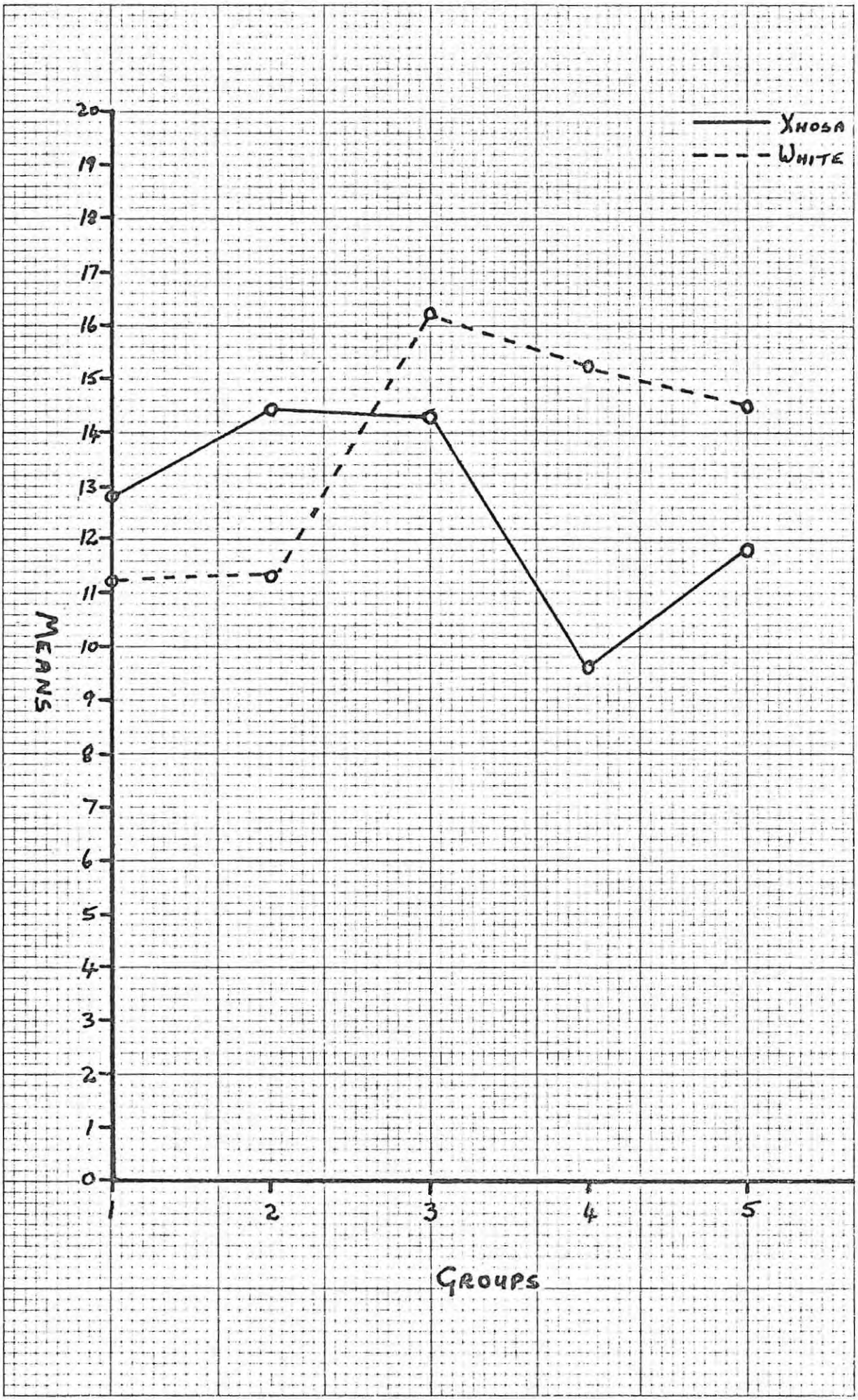


FIG. 28. DISTRIBUTION OF GSRT SCORES FOR GROUP 1.

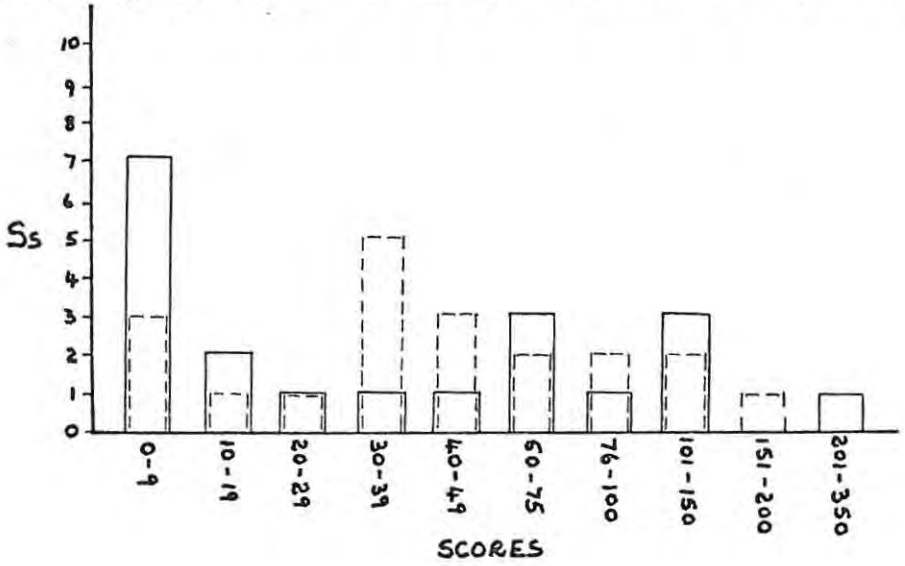


FIG. 29. DISTRIBUTION OF GSRT SCORES FOR GROUP 2.

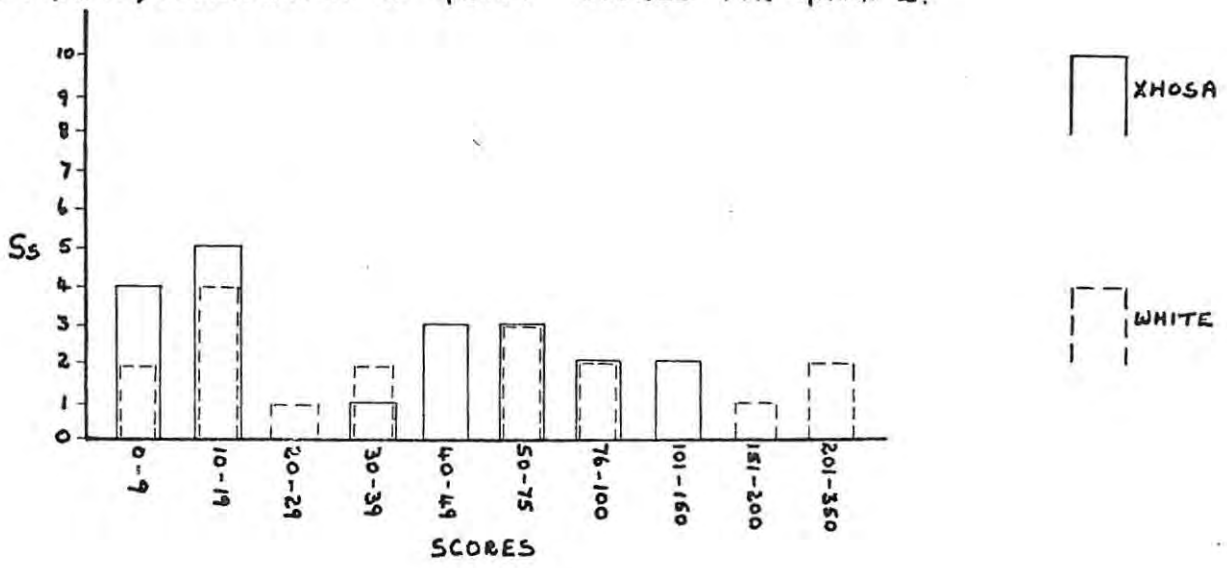


FIG. 30. DISTRIBUTION OF GSRT SCORES FOR GROUP 3.

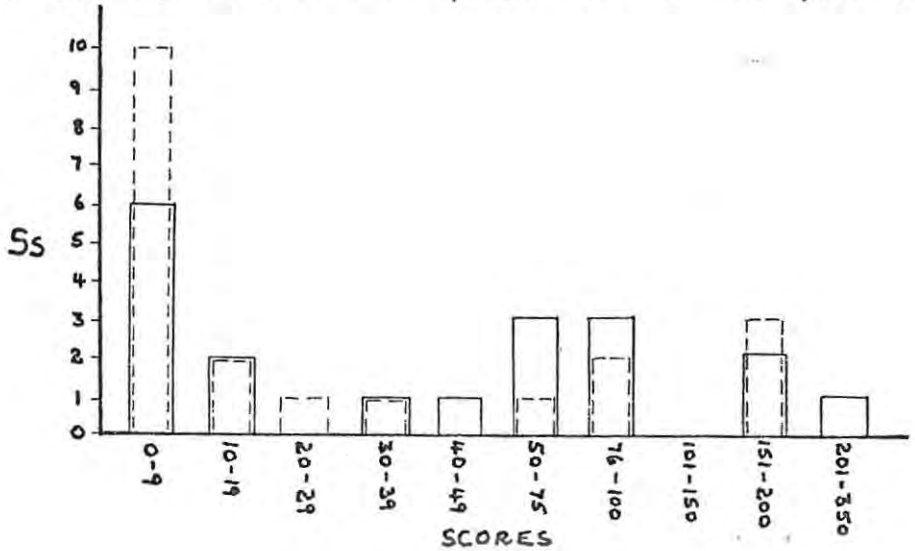
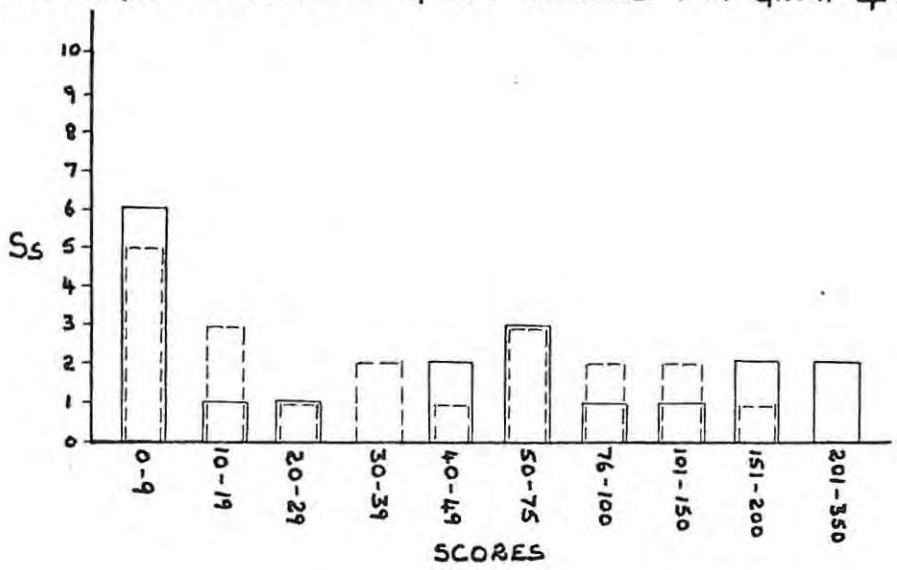


FIG.31. DISTRIBUTION OF GSRT SCORES FOR GROUP 4.



XHOSA

WHITE

FIG.32. DISTRIBUTION OF GSRT SCORES FOR GROUP 5.

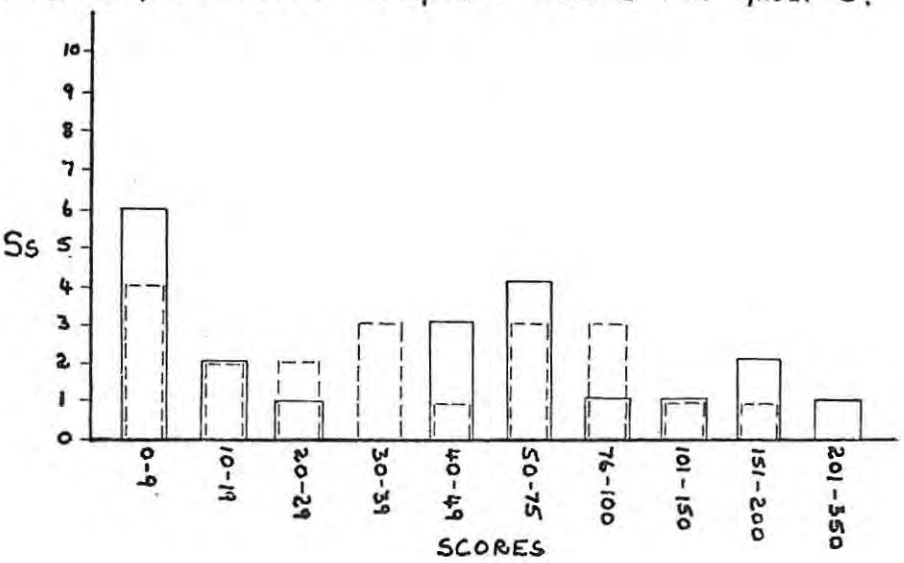


FIG. 33. GSRT MEANS FOR XHOSA AND WHITE GROUPS.

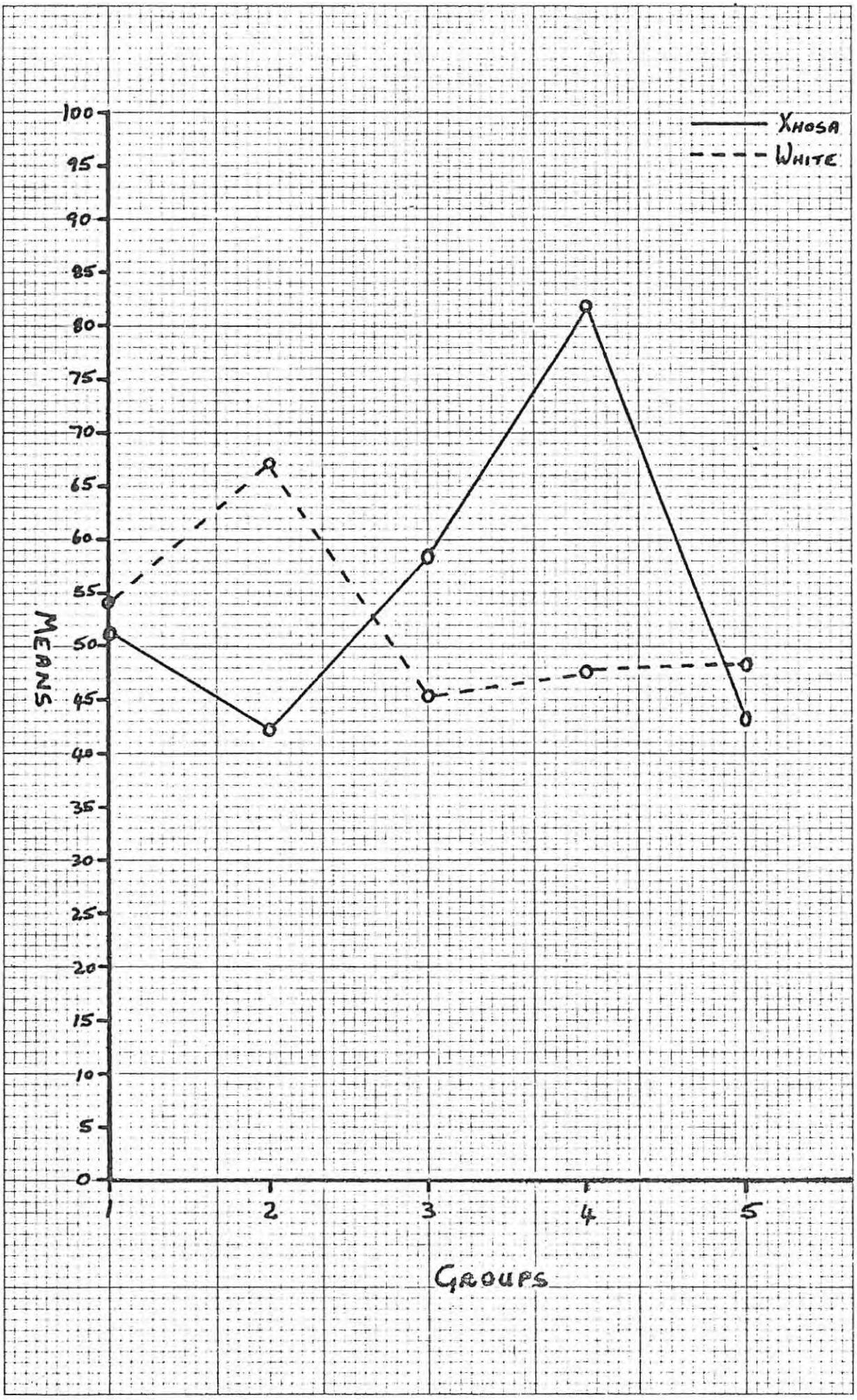
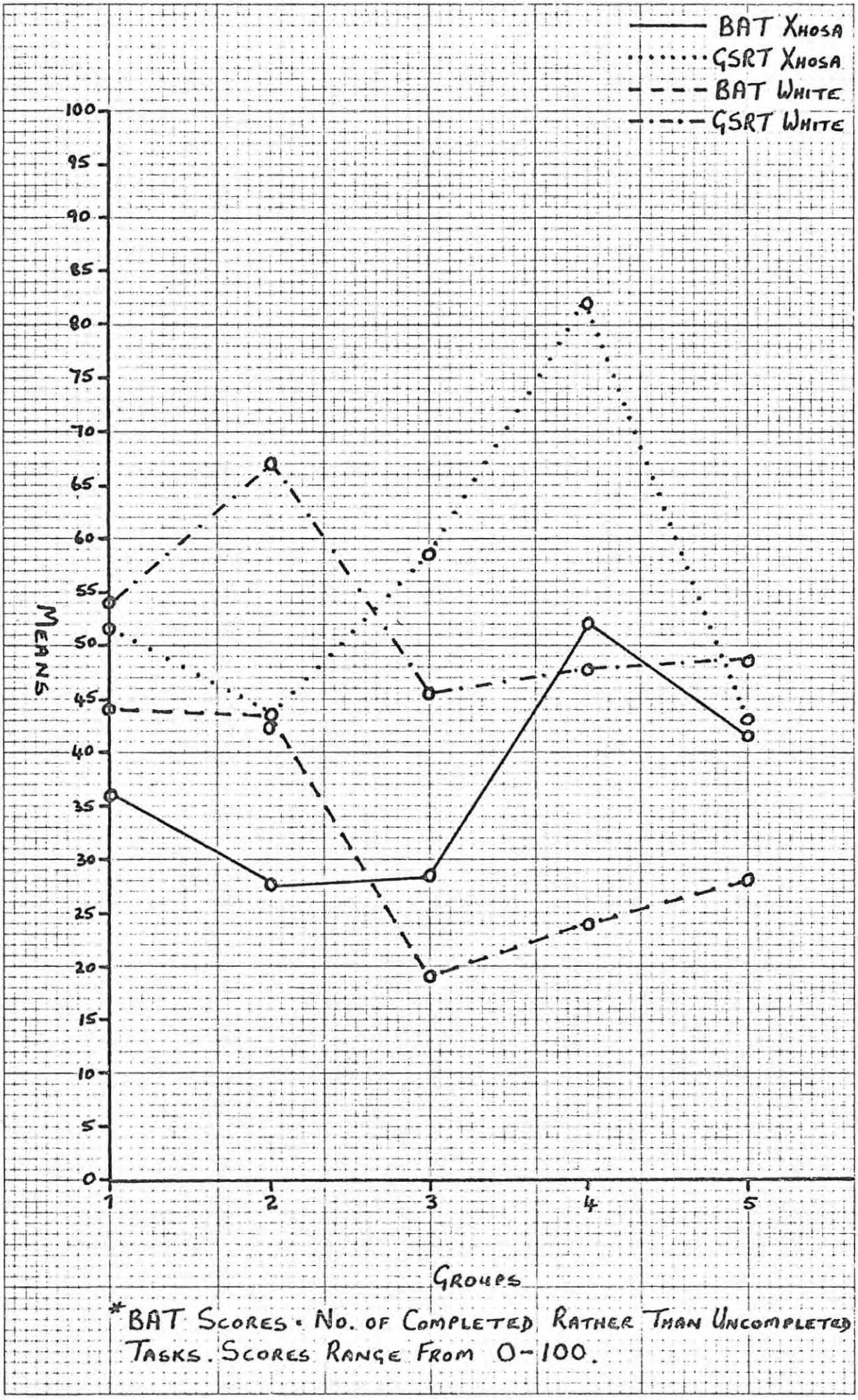


FIG. 34. BAT* AND GSRT MEANS FOR XHOSAS AND WHITES.



*BAT SCORES - NO. OF COMPLETED RATHER THAN UNCOMPLETED TASKS. SCORES RANGE FROM 0-100.

5.4. The Analysis of the Data

5.41. Analysis of the Complete Data

To determine whether there were any significant differences between the means for each group on the five measures, the data was analyzed by an analysis of variance for a completely randomized factorial (CRF) 2 x 5 design.

The experiment was designed so as to have 20 subjects in each of the 10 groups tested. However, three Xhosa subjects and three White subjects insisted on the GSRT being terminated before the completion of the first five steps. GSRT scores for these subjects were, therefore, unavailable. One Xhosa subject refused to perform any of the BAT tasks for the reasons mentioned in 5.1. Because of these unequal numbers of subjects, in some of the groups, on two of the five measures, all the data were analyzed by an unequal means analysis. The F ratio was calculated according to the procedure proposed by Kirk (1968). Where the numbers of subjects in each cell are equal, the unweighted means analysis gives identical results to a conventional analysis of variance. All calculations were made by electronic computer.

In each of the analysis of variance tables to be presented in this section a F ratio for three sources of variance will be provided. The A source of variance was produced by the cultural variable. The B source of variance was produced by the age variable, while the interaction of age and culture produced the AB source of variance.

The ABS Summary Tables for all the data can be found in Appendix Three.

PSES

From Table 11 we see that the F ratios for the A and B source of variance are highly significant ($p < .01$). This indicates in the first

place a difference between the performances of the Xhosa and the White groups when these performances are considered across the age-groups. Secondly, when differences of age are distinguished across both cultures performance is seen to depend on the age group. The significant ratio for the AB source of variance indicates an interaction between age and culture.

TABLE 11. Analysis of Variance Table for the PSES

Source of Variance	SS	df	MS	F
A	137.78	p - 1 = 1	137.78	22.66**
B	409.78	q - 1 = 4	102.45	16.85**
AB	66.02	(p-1)(q-1)=4	16.51	2.72*
W. cell	1155.30	N - pq = 190	6.08	

A .01 = 6.76; A .05 = 3.89

B & AB .01 = 3.41; B & AB .05 = 2.42

* $p < .05$

** $p < .01$

These findings are of particular interest. Rachman and Costello (1961) proposed that phobias are conditioned fear reactions. In terms of this theory, any neutral stimulus, which makes an impact on an individual, at the same time that a fear reaction takes place, will acquire the ability to subsequently evoke fear. The more aversive the stimulus, and the more frequently the subject is exposed to noxious stimulation, the stronger will be the fear reaction.

From the behaviourists' account of the learning of a particular fear it can be predicted that subjects who have undergone highly aversive encounters with snakes will show a more intense fear of snakes than subjects who have not been involved in equally aversive encounters.

Therefore, from the analysis of variance of the PSES data it can be justifiably predicted that groups which have significantly higher PSES means will show greater fear on the BAT and the GSRT than groups with lower PSES means.

The finding that the combined PSES mean for Xhosa groups is significantly higher than the combined PSES mean for Whites indicates a difference in experience of snakes for the two groups. This difference predisposes to differences between Whites and Xhosas on the BAT and the GSRT. The validity of this proposal will be tested below.

An analysis of variance provides only limited information on the relationship between a number of means. For example, from the analysis of variance table presented above a significant F ratio shows that there is a significant difference between at least two of the means. However, information on where the difference exists is not provided. If, for instance, five means are involved there could be only one significant difference or 10 significant differences.

Kirk (1968) stated that two tests are suitable for the pair-wise comparison of means, namely Dunn's Multiple Comparison Procedure and Tukey's HSD Test. Kirk maintained that as the number of comparisons between means is reduced, Dunn's test becomes more powerful than Tukey's. However, in the present experiment it was found that when making either 45 comparisons between paired means or five comparisons between paired means, Dunn's test was in each case the more conservative. For example, 45 comparisons were made between the BAT means for each of the 10 groups. (See Table 18.) Dunn's equation produced a value of 2.69 (p.01) for a significant difference between a pair of means. The corresponding value for Tukey's HSD test was 1.83 (p.01). When five comparisons were made between the BAT means for Xhosa subjects showing HF on the GSRT and the BAT means for Xhosa subjects showing LF on the GSRT, Dunn's value for a

significant differences between means was 3.34 (p.01), while the value for Tukey's test was 2.84 (p.01).

The equation used for Dunn's test was that presented by Kirk (1968). By substituting data in the equation for Dunn's test a value d is obtained. Any difference between two means which exceeds the value for d is significant at the level of significance chosen.

TABLE 12.

Means	X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
X1=3.95	-	0.20	2.40*	4.00*	4.50*	1.55*	0.55	0.75	1.65*	1.40*
X2=4.15		-	2.20*	3.80*	4.30*	1.75*	0.35	0.55	1.45*	1.20
X3=6.35			-	1.60*	2.10*	3.95*	1.85*	1.65*	0.75	1.00
X4=7.95				-	0.50	5.55*	3.45*	3.25*	2.35*	2.60*
X5=8.45					-	6.05*	3.95*	3.75*	2.85*	3.10*
W1=2.40						-	2.10*	2.30*	3.20*	2.95*
W2=4.50							-	0.20	1.10	0.85
W3=4.70								-	0.90	0.65
W4=5.60									-	0.15
W5=5.35										-

$d.01 = 1.29$

$^{*}p < .01$

The differences between means in Table 12 which are of particular interest are those showing differences between age-groups and those showing differences between Xhosa and White groups. There is a significant increase in mean PSES scores from X2 to X3 and from X3 to X4. For the White groups there is a significant increase in mean PSES scores only from W1 to W2. The means for the four older White groups are all significantly greater than the mean for W1.

Comparing the PSES means for Xhosa and White groups we find that the PSES means for X1, X2, X3 and X5 are significantly higher than the means for the corresponding White groups. There is no significant difference between the means for X4 and W4.

VSES

TABLE 13. Analysis of Variance Table for the VSES

Source of Variance	SS	df	MS	F
A	2.00	p - 1 = 1	2.00	0.43
B	162.67	q - 1 = 4	40.67	8.77**
AB	36.75	(p-1)(q-1) = 4	9.19	1.98
W. cell	881.70	N - pq = 190	4.64	

A .01 = 6.76; A .05 = 3.89

B & AB .01 = 3.41; B & AB .05 = 2.42

* $p < .05$

** $p < .01$

Only the B source of variance produced a significant F ratio ($p < .01$), indicating that there are significant differences between the means for the various age-groups.

Bandura (1961) and Bandura, Blanchard and Ritter (1969) convincingly demonstrated the possibility of social learning through the imitation of a model. If a subject, particularly a child, has witnessed a model (e.g. a parent) exhibiting a fear of snakes, this could result in the child imitating the modelled fear.

In Bandura et. al's. (1969) study of the antecedents of snake phobia behaviour, it was found that a large percentage of subjects claimed having vicariously experienced the fear of snakes.

This significant difference between the means for the age groups suggests, on the basis of the social learning theory, that it could be expected that the groups having higher VSES means would exhibit more fear on the BAT and the GSRT. Further, social learning theory also predicts increasing fear with age. These hypotheses will be tested below.

TABLE 14. Differences Between VSES Means for All Groups

Means	X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
X1=4.20	-	1.50*	1.80*	3.40*	3.40*	0.85	2.00*	1.70*	2.70*	1.85*
X2=5.70		-	0.30	1.90*	1.90*	0.65	0.50	0.20	1.20*	0.35
X3=6.00			-	1.60*	1.60*	0.95	0.20	0.10	0.90	0.95
X4=7.60				-	0.00	2.55*	1.40*	1.70*	0.70	1.55*
X5=7.60					-	2.55*	1.40*	1.70*	0.70	1.55*
W1=5.05						-	1.15*	0.85	1.85*	1.00
W2=6.20							-	0.30	0.70	0.15
W3=5.90								-	1.00	0.15
W4=6.90									-	0.85
W5=6.05										-

$$d_{.01} = 1.13$$

$$^{*}p < .01$$

The VSES means for X1 and X3 are significantly lower than the means for X2 and X4, respectively. The differences between X2 and X3 and between X4 and X5 are not significant. For the White groups only the difference between W1 and W2 is significant.

When comparing the corresponding means for White and Xhosa groups it will be noticed that only the difference between X5 and W5 is significant, with X5 being significantly higher than W5.

It is interesting to note that for White subjects a significant

increase in PSES and VSES means between age-groups occurs only between W1 and W2. If aversive experiences of snakes are the critical independent variables in the fear of snakes, then we would expect a significant increase in the fear of snakes between W1 and W2 and then a relatively constant fear of snakes after the age of 9 - 11 years. This, in fact, was not found. For the Xhosa groups there is a more pronounced increase in the level of aversive experiences with an increase in age.

SAS

TABLE 15. Analysis of Variance Table for the SAS

Source of Variance	SS	df	MS	F
A	1468.82	p - 1 = 1	1468.82	11.87**
B	612.02	q - 1 = 4	153.01	11.65**
AB	380.18	(p-1)(q-1) = 4	95.05	7.24**
W. cell	2494.40	N - pq = 190	13.13	

A .01 = 6.76; A .05 = 3.89

B & AB .01 = 3.41; B & AB .05 = 2.42

*p $<$ .05

**p $<$ .01

Each of the three sources of variance produced highly significant ($p < .01$) F ratios. This indicates that there are not only significant differences between the two cultural groups and across the age-groups, but that there was also a significant interaction between the cultural and age variable.

TABLE 16. Differences Between SAS Means for All Groups

Means	X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
X1=15.30	-	2.90*	0.10	2.10*	0.80	0.95	0.60	7.05*	5.15*	7.45*
X2=18.20		-	2.80*	0.80	2.10*	3.85*	3.50*	9.95*	8.05*	10.35*
X3=15.40			-	2.00*	0.70	1.05	0.70	7.15*	5.25*	7.55*
X4=17.40				-	1.30	3.05*	2.70*	9.15*	7.25*	9.55*
X5=16.10					-	1.75	1.40	7.85*	5.95*	8.25*
W1=14.35						-	0.35	6.10*	4.20*	6.50*
W2=14.70							-	6.45*	4.55*	6.85*
W3= 8.25								-	1.90*	0.40
W4=10.15									-	2.30*
W5= 7.85										-

$d_{.01} = 1.89$

$^{*}p < .01$

An interesting trend emerges from the comparison of the SAS means for Xhosa groups. The mean for X1 is significantly lower than the mean for X2; the mean for X2 is significantly higher than the mean for X3; the mean for X3 is significantly lower than the mean for X4. The difference between the means for X4 and X5 is not significant.

For the White group, the SAS mean for W3 is significantly lower than the mean for W2; the mean for W3 is significantly lower than the mean for W4; the mean for W4 is significantly higher than the mean for W5. The means for W1 and W2 are significantly higher than the means for the older three groups.

When the corresponding SAS means for Xhosa and White groups are compared, it will be noted that, except for X1 and W1, in each of the other comparisons the means for the White groups are significantly lower than the corresponding means for Xhosa groups.

The SAS was designed particularly to measure the extent of the subject's irrational attitudes towards snakes. The significant drop in SAS scores from W2 to W3 can possibly be explained in terms of maturation and more advanced education. However, why these factors should not have had a comparable influence on the SAS scores of the Xhosa subjects is difficult to explain. The disparity in the educational qualifications of W4 (university students) and X4 (cleaners and gardeners) must be mentioned as a possible critical variable in the marked difference between the SAS scores of these two groups. This explanation is, however, weakened by the fact that the mean PSES score for X4 is considerably higher than the mean PSES score for W4. The fact that the majority of the Xhosa subjects had come into very much closer contact with live snakes than the White subjects, could be expected to have dispelled certain of the erroneous beliefs held about the snake. It cannot be denied that subjects in W3, W4 and W5 were far more likely than subjects in X3, X4 and X5 to have come across literature or other sources of information exploding many of the myths generally associated with the snake. This view is reinforced by the fact that the differences between the means for X1 and W1, and X2 and W2, are much smaller than the differences between the older three groups.

Significantly more White subjects claimed to have seen a live snake in captivity than Xhosa subjects (72% as opposed to 28%). However, in the youngest age-group only six White children and six Xhosa children claimed to have seen a live snake in captivity. The opportunity of seeing a live snake in captivity permits the individual to obtain, at first-hand, factual information about snakes. Furthermore, many of the White subjects, except in W1, claimed to have visited a snake-park. During demonstrations, visitors to snake-parks are generally given a certain amount of information about snakes. None of the Xhosa subjects had ever had an opportunity of

visiting a snake-park. A number of subjects in W3 and W4 claimed to have kept snakes as pets while at boarding-school. Several subjects in W2, W3 and W4 told the Experimenter that they had caught snakes in the veld. No Xhosa subject reported having engaged in these types of activities.

The Xhosa subjects, with very few exceptions, belonged to a typically low socio-economic group, and the literate subjects would have had virtually no opportunities of gaining access to literature on snakes. The balance is overwhelmingly tipped in favour of the Whites being presented with the means for dispelling erroneous beliefs about snakes. These factors would have the greatest effect when the boy has developed a keen interest in animals and is able to read efficiently.

If a subject has extremely negative attitudes towards snakes, it would be expected that he would avoid a snake more than a person holding more positive attitudes. If a subject believes that a snake is an evil, dirty, slimy, dangerous animal, he is not likely to be prepared to handle a snake. We would expect those Xhosa groups having significantly higher SAS means than the corresponding White groups to show a greater avoidance of the snake in the BAT than the White subjects. However, Wicker (1969) has shown that usually there is little correlation between attitudes and overt behaviour towards the attitude object.

BAT

Table 17. Analysis of Variance Table for the BAT

Source of Variance	SS	df	MS	F
A	58.24	p - 1 = 1	58.24	2.30
B	249.77	q - 1 = 4	62.44	2.47*
AB	491.43	(p-1)(q-1) = 4	122.86	4.86**
W. cell	4800.96	N - pq = 190	25.27	

A .01 = 6.76; A .05 = 3.89

B & AB .01 = 3.41; B & AB .05 = 2.42

* $p < .05$

** $p < .01$

Table 17 indicates that there is no significant difference between the combined mean for the five Xhosa groups, and the combined mean for the five White groups, while there is a significant difference between at least two of the means for the age groups. The AB source of variance is highly significant, i.e. there is a significant interaction between the cultural and age variable.

TABLE 18. Differences Between BAT Means for All Groups

Means	X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
X1=12.85	-	1.60	1.45	3.25*	1.60	1.65	1.55	3.35*	2.40	1.60
X2=14.45		-	0.15	4.85*	2.66	3.25*	3.15*	1.75	0.80	0.00
X3=14.30			-	4.70*	2.51	3.10*	3.00*	1.90	0.95	0.15
X4= 9.60				-	2.19	1.60	1.70	6.60*	6.65*	4.85*
X5=11.79					-	0.59	0.49	4.41*	3.46*	2.66
W1=11.20						-	0.10	5.00*	4.05*	3.25*
W2=11.30							-	4.90*	3.95*	3.15*
W3-16.20								-	0.95	1.75
W4=15.25									-	0.80
W5=14.45										-

d .01 = 2.69

*p < .01

For the Xhosa groups, the BAT mean for X4 is significantly lower than the means for X1, X2 and X3. The difference between the means for X4 and X5 is not significant.

The group showing least fear on the BAT is W3. The mean for W3 is significantly higher than the means for W1 and W2. The means for W4 and W5 are also significantly higher than the means for W1 and W2. There are no significant differences between the means for the three older White groups.

When comparing the BAT means for Xhosa and White groups, surprisingly few significant differences emerge. The mean for X2 is significantly higher than the mean for W2, while the mean for X4 is significantly lower than the mean for W4. The differences between X1 and W1, X3 and W3, and between X5 and W5 are not significant.

Jones and Jones (1928) reported that the fear of snakes increases with age reaching a highest level in a group of university students. An almost completely contradictory trend was found for the White subjects in the present experiment. It is interesting to note that the fear of snakes, as measured by the BAT, did reach the highest level in the 18-20 year Xhosa group.

If the cultural background of the subject is an independent variable of critical importance in the fear of snakes then we would expect to find consistent significant differences between Xhosa and White groups. The BAT means definitely do not support the popular notion that Xhosas are very much more afraid of snakes than Whites.

Subjects in X2 showed significantly less fear on the BAT than subjects in W2. Which independent variables would possibly account for this finding? No significant difference exists between the PSES and VSES means for these two groups. However, the SAS mean for X2 is significantly higher than the SAS mean for W2. The fact that subjects in X2 held more

negative attitudes towards snakes should predispose these subjects to show more fear on the BAT than subjects in W2, rather than less fear. Some variable or variables other than aversive experiences and negative attitudes must account for the differences in BAT scores. It should be mentioned that the difference in socio-economic status between Xhosa and White subjects was smallest between X1 and W1, and X2 and W2. The differences between the other groups were vast. Most of the White subjects in W1 and W2 came from very poor homes, and at least half of the subjects in W1 and approximately eight subjects in W2 lived in homes bordering on the African or Coloured slum areas. If socio-economic status is an important independent variable in the fear of snakes, then significant differences should have been found between the BAT means for each of the three older age-groups where the gap in socio-economic status was far wider than in the two younger age-groups. The difference in socio-economic status between Xhosas and Whites was probably most marked between X3 and W3, however, there is no significant difference between the BAT means for these two groups.

White subjects in W4 showed significantly less fear of snakes, as measured by the BAT, than subjects in X4. This difference cannot be accounted for in terms of differences in aversive experience. No significant difference was found between the PSES and VSES means for these two groups. The SAS mean for X4 is significantly higher than the SAS mean for W4. However, the absence of a significant relationship between negative attitudes and performance on the BAT has already been discussed. Apart from cultural factors, the most apparent differences between these two groups was socio-economic status and educational achievement, i.e. White university students as opposed to Xhosa gardeners and cleaners. If these two factors are important independent variables in the fear of of snakes, then differences in BAT means should also have been found

between X3 and W3, and X5 and W5.

The picture is extremely complex and no previous research on the fear of snakes suggests independent variables to account for the findings of the present experiment.

GSRT

TABLE 19. Analysis of Variance Table for the GSRT % Increase

Source of Variance	SS	df	MS	F
A	311.15	p - 1 = 1	311.15	0.09
B	6725.40	q - 1 = 4	1681.35	0.47
AB	17753.25	(p-1)(q-1)=4	4438.31	1.24
W. cell	680394.90	N - pq = 190	3581.03	

A .01 = 6.76; A .05 = 3.89

B & AB .01 = 3.41; B & AB .05 = 2.42

*p < .05

**p < .01

From Table 19 we see that no significant F ratio was produced by an analysis of variance of the mean percentage increase in GSRs for each group. The error term, within-cell mean square, was extremely large making a significant F ratio unlikely. The large error term was the result of the wide range of GSRT scores, i.e. 0% - 391%.

Barlow, Leitenberg and Wincze (1969) subjected GSR values to a log transformation because of wide inter-subject variability. This had the effect of "drawing-in" the extreme scores and thereby, reduced the error term.

This procedure was adopted in the present experiment in an attempt to reduce the extremely large error term. The log of the percentage increase was taken for each subject. The resultant table of means is

shown in Table 20.

It will be noticed that by taking the log of the percentage increase, the pattern of the GSRT means changes, e.g. compare the means for X4 and W1. Refer back to Figures 28 and 31 for the distribution of the GSRT scores for W1 and X4, respectively. It will be seen that the high mean for X4 is due to several unusually high scores, while the scores for W1 show a far greater consistency. By taking the log of the percentage increase the GSRT mean for X4 has been considerably reduced to a lower value than that for W1.

TABLE 20. Means of Log Percentage Increases and Means of Percentage Increases

Group	Percentage Increase	Log of Percentage Increase
X1	51.48	2.73
X2	42.59	3.11
X3	58.55	2.95
X4	80.19	3.01
X5	43.02	2.72
W1	54.27	3.49
W2	67.21	3.54
W3	45.41	2.15
W4	47.77	2.93
W5	48.49	3.19

From Table 21 it will be seen that even with the log transformation, the F ratios still did not approach significance.

TABLE 21. Analysis of Variance Table for the Log of Percentage Increase in GSRs

Source of Variance	SS	df	MS	F
A	1.18	p - 1 = 1	1.18	0.35
B	12.42	q - 1 = 4	3.11	0.93
AB	14.60	(p-1)(q-1) = 4	3.65	1.10
W. cell	632.12	N - pq = 190	3.33	

A .01 = 6.76; A .05 = 3.89

B & AB .01 = 3.41; B & AB .05 = 2.42

*p $<$ .05

**p $<$ .01

Subjecting the percentage increases in GSRs to a log transformation did not solve the problem of a large error term and at the same time changed the pattern of the means. In the following analysis of the data the percentage increases in GSRs will be used as the GSRT scores.

TABLE 22. Differences Between GSRT Means for All Groups

Means	X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
X1=51.48	-	8.89	7.07	28.71	8.46	2.79	15.73	6.07	3.71	2.99
X2=42.59		-	15.96	37.60*	0.43	11.68	24.62	2.82	5.18	5.90
X3=58.55			-	21.64	15.53	4.28	8.66	13.14	10.78	10.06
X4=80.19				-	37.17*	25.92	12.98	34.78*	32.42*	31.70*
X5=43.02					-	11.25	24.19	2.39	4.75	5.47
W1=54.27						-	12.94	8.86	6.50	5.78
W2=67.21							-	21.80	19.44	18.72
W3=45.41								-	2.36	3.08
W4=47.77									-	0.72
W5=48.49										-

d .01 = 31.99

*p $<$ .01

The GSRT mean for X4 is significantly higher than the mean for X2 and X5. No significant differences exist between the means for White groups.

The mean for X4 is significantly higher than the mean for W4. It is interesting to note that the difference between X2 and W2 is almost significant at the .05 level. These differences between Xhosa and White groups are essentially the same as those found between the BAT means for Xhosa and White groups.

The level of the fear of snakes, as measured by the GSRT, remains strikingly constant for the White groups. These findings support Russell's (1967) conclusion, based on a self-report measure of the fear of snakes, that the fear of snakes maintains a more or less constant level from the age of 11 years to "senior citizen".

If aversive experiences, negative attitudes, cultural background, educational achievement, socio-economic status, and age are independent variables in the fear of snakes, then differences across age-groups and between Xhosa and White groups should have been found between GSRT means to a far greater extent. The finding that, only in the case of X4 did a Xhosa group have a significantly higher GSRT mean than a corresponding White group, shows that, on the whole, there is no consistent significant difference between the fear of snakes in Xhosa and White subjects, as measured by the GSRT.

5.42. Analysis of Data Split According to Subjects' Performance on the BAT

The question was considered as to whether there is any significant relationship between a subject's performance on the BAT and his scores on the PSES, VSES, SAS and GSRT. The sort of questions asked were : Does a subject who scores low on the BAT have high PSES and VSES scores? Does a subject who holds extremely negative attitudes towards snakes score higher or lower on the BAT than subjects who have less negative attitudes? Do subjects who score high on the BAT (show little fear) also show low fear on the GSRT?

It was arbitrarily decided to make the score of 14 the cut-off point on the BAT. The PSES, VSES, SAS and GSRT scores of subjects scoring 13 or less on the BAT (i.e. subjects who were not prepared to touch the snake with a bare hand) were compared with the PSES, VSES, SAS and GSRT scores of subjects who scored 14 or higher on the BAT (i.e. subjects who were prepared to touch the snake with a bare hand). Throughout this section subjects scoring 13 or less on the BAT will be referred to as high-fear (HF) subjects, while subjects scoring 14 or higher on the BAT will be referred to as low-fear (LF) subjects.

An analysis of variance was performed separately on the PSES, VSES, SAS and GSRT data of Xhosa and White subjects showing HF or LF on the BAT. The analysis of variance tables to be presented will provide a F ratio for three sources of variance. Of particular interest is the A source of variance produced by the variable of HF or LF on the BAT. The B source of variance was produced by the variable of age. The AB source of variance was produced by interaction between the level of fear variable and the age variable. If a significant F ratio is obtained for the A source of variance for the PSES means, it will have been shown that there is a significant difference between the combined PSES

means for HF and LF subjects as measured by the BAT.

However, the possibility remains that are significant differences between a number of HF and LF means for particular age groups. Therefore, paired comparisons will be made between HF and LF means for each age group. Dunn's Multiple Comparison Procedure was used.

In the paired comparison tables to follow in this section, "L" will be used to designate the LF means, while "H" will be used as a symbol for HF means. For example, X2L is the mean for LF subjects in the group X2, while X5H is the mean for HF subjects in the group X5.

By substituting data in the equation for Dunn's test a value d is obtained. Any difference between paired means exceeding d is significant. A .01 level of significance will be used throughout this section.

TABLE 23. PSES Means for Xhosa Subjects Showing HF or LF on the BAT

Group	Means for HF Ss	Means for LF Ss
X1	2.50	4.92
X2	3.20	4.47
X3	5.50	6.71
X4	7.94	8.00
X5	8.50	8.40

A particularly interesting and completely unexpected trend can be seen in Table 23. Apart from X5, the mean PSES scores for the Xhosa subjects showing LF on the BAT indicates a greater extent of personal aversive experiences of snakes than for the subjects showing HF on the BAT. A graph of these means can be found in Figure 35.

TABLE 24. Analysis of Variance Table for PSES Means of Xhosa Groups

Source of Variance	SS	df	MS	F
A	19.27	p - 1 = 1	19.27	2.83
B	323.68	q - 1 = 4	80.92	11.90**
AB	17.17	(p-1)(q-1) = 4	4.29	0.63
W. cell	611.65	N - pq = 90	6.80	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

The A source of variance did not produce a significant F ratio. Therefore, the combined PSES mean for HF subjects does not differ significantly from the combined PSES mean for LF subjects.

TABLE 25. Differences Between PSES Means for HF and LF Xhosa Subjects

	X1L = 4.92	X2L = 4.47	X3L = 6.71	X4L = 8.00	X5L = 8.40
X1H = 2.50	2.42*				
X2H = 3.20		1.27			
X3H = 5.50			1.21		
X4H = 7.94				0.06	
X5H = 8.50					0.10

d .01 = 1.82

*p $<$ .01

From the paired comparison of means in Table 25 it will be seen that X2L is significantly higher than X1H. Subjects in X1 showing LF scored significantly higher in personal aversive experiences with snakes than HF subjects.

TABLE 26. PSES Means for White Subjects Showing HF or LF on the BAT

Group	Means for HF Ss	Means for LF Ss
W1	2.27	2.56
W2	4.00	5.00
W3	3.25	5.06
W4	2.20	6.60
W5	4.00	6.08

A distinct trend is apparent in Table 26. For each group the mean PSES score for LF subjects is higher than the corresponding PSES means for HF subjects. A graph of these means can be found in Figure 35.

TABLE 27. Analysis of Variance Table for PSES Means of White Groups

Source of Variance	SS	df	MS	F
A	76.30	p - 1 = 1	76.30	16.96**
B	66.21	q - 1 = 4	16.55	3.68**
AB	40.50	(p-1)(q-1) = 4	10.13	2.25
W. cell	405.42	N - pq = 90	4.50	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .01 = 2.45

*p $<$ .05

**p $<$ .01

The significant F ratio for the A source of variance indicates that there is a significant difference between the combined means for HF and LF subjects, i.e. the combined mean for LF subjects is significantly higher than the combined mean for HF subjects.

TABLE 28. Differences Between PSES Means for HF and LF White Subjects

	W1L = 2.56	W2L = 5.00	W3L = 5.06	W4L = 6.60	W5L = 6.08
W1H = 2.27	0.29				
W2H = 4.00		1.00			
W3H = 3.25			1.81*		
W4H = 2.20				4.40*	
W5H = 4.00					2.08

d .01 = 1.47

*p $<$ .01

For three of the five White groups the PSES means for LF subjects are significantly higher than the PSES means for HF subjects.

In no single instance is a PSES mean for HF subjects significantly higher than the PSES mean for LF subjects in the same group. However, in four out of the 10 White and Xhosa groups the PSES mean for LF subjects is significantly higher than the PSES mean for HF subjects. For the majority of the groups there is no significant difference between the PSES means for HF and LF subjects.

These findings indicate that there is no significant overall relationship between the subjects' performance on the BAT and the extent of their personal experiences with snakes. This applies to both the Xhosa and the White subjects. According to the behaviourist theory of the learning of fear, it would have been hypothesized that a high level of personal aversive experience would correlate significantly with a high level of fear on the BAT. The trend apparent in Tables 23 and 26 is completely contrary to this hypothesis.

VSES

TABLE 29. VSES Means for Xhosa Subjects Showing HF or LF on the BAT

Group	Means for HF Ss	Means for LF Ss
X1	4.63	3.92
X2	5.80	5.67
X3	6.83	5.64
X4	7.69	7.25
X5	7.60	7.60

The trend found for PSES means appears to be reversed in Table 29. Except for X5, the VSES means for subjects showing HF on the BAT are higher than the means for LF subjects. A graph of these means can be found in Figure 36.

TABLE 30. Analysis of Variance Table for VSES Means of Xhosa Groups

Source of Variance	SS	df	MS	F
A	4.98	p - 1 = 1	4.98	0.80
B	122.25	q - 1 = 4	30.56	4.93**
AB	3.71	(p-1)(q-1) = 4	0.93	0.15
W. cell	557.96	N - pq = 90	6.20	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

The trend apparent in Table 29 does not reflect a significant difference between the combined VSES means for HF and LF subjects as

determined by BAT scores. There is a significant change in VSES means with age.

TABLE 31. Differences Between VSES Means for HF and LF Xhosa Subjects

	X1L = 3.92	X2L = 5.67	X3L = 5.64	X4L = 7.25	X5L = 7.60
X1H = 4.63	0.71				
X2H = 5.80		0.27			
X3H = 6.83			1.19		
X4H = 7.69				0.44	
X5H = 7.60					0.00

d .01 = 1.74

*p < .01

The F ratio for the difference between the overall means for LF and HF subjects is very low and does not approach significance (Table 30). It is therefore not surprising that none of the paired means in Table 31 differs significantly from each other.

TABLE 32. VSES Means for White Subjects Showing HF or LF on the BAT

Group	Means for HF Ss	Means for LF Ss
W1	4.55	5.67
W2	6.10	6.30
W3	4.75	6.19
W4	5.40	7.40
W5	5.71	6.23

Of particular interest in Table 32 is the fact that the means show a similar, but not as distinct a trend as the PSES means for White groups. However, each of the VSES means for LF subjects is higher than

the corresponding VSES means for HF subjects. A graph of these means can be found in Figure 36.

TABLE 33. Analysis of Variance Table for VSES Means for White Groups

Source of Variance	SS	df	MS	F
A	23.17	p - 1 = 1	23.17	7.31**
B	18.93	q - 1 = 4	4.73	1.49
AB	8.60	(p-1)(q-1) = 4	2.15	0.68
W. cell	285.45	N - pq = 90	3.17	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

The A source of variance produced a high F ratio indicating that the trend apparent in Table 32 is statistically significant. The combined VSES mean for LF subjects is significantly higher than the combined VSES mean for HF subjects.

TABLE 34. Differences Between VSES Means for HF and LF White Subjects

	W1L = 5.67	W2L = 6.30	W3L = 6.19	W4L = 7.40	W5L = 6.23
W1H = 4.55	1.12				
W2H = 6.10		0.20			
W3H = 4.75			1.44*		
W4H = 5.40				2.00*	
W5H = 5.71					0.52

These results are similar to those found for HF and LF White subjects on the PSES. In Table 34 the VSES mean for W3L is significantly

higher than the VSES mean for W3H. The significant difference between the VSES means for W4 is in the same direction.

Bandura, Blanchard and Ritter (1969) suggested that vicarious aversive experiences of snakes are important factors in the development of snake phobia. It is indeed surprising that in not one of the five Xhosa and five White groups was the VSES mean for HF subjects significantly higher than the VSES mean for LF subjects. On the other hand, two of the White groups showed a significant trend in the opposite direction. The vicarious aversive experience of snakes per se does not appear to be of critical importance in the intensity of the fear of snakes as measured by the BAT.

SAS

TABLE 35. SAS Means for Xhosa Subjects Showing HF or LF on the BAT

Group	Means for HF Ss	Means for LF Ss
X1	14.00	16.17
X2	18.80	18.00
X3	16.17	15.07
X4	16.94	19.25
X5	16.60	15.60

An examination of Table 35 will reveal that, unlike the PSES and VSES, there is no distinct trend in the SAS scores for HF and LF subjects as determined by performance on the BAT. For two groups, X1 and X4, the SAS mean for LF subjects is higher than the SAS mean for HF subjects. Three groups, X2, X3 and X5, have lower SAS means for LF subjects than for HF subjects.

TABLE 36. Analysis of Variance Table for SAS Means for Xhosa Groups

Source of Variance	SS	df	MS	F
A	2.05	p - 1 = 1	2.05	0.25
B	146.32	q - 1 = 4	36.58	4.42**
AB	50.51	(p-1)(q-1) = 4	12.63	1.53
W. cell	744.72	N - pq = 90	8.27	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

From Table 36 it can be concluded that the combined SAS means for LF and HF subjects do not differ significantly. Once again it will be noted that there are significant differences between the means for the age-groups.

TABLE 37. Differences Between SAS Means for HF and LF Xhosa Subjects

	X1L = 16.17	X2L = 18.00	X3L = 15.07	X4L = 19.25	X5L = 15.60
X1H = 14.00	2.17*				
X2H = 18.80		0.80			
X3H = 16.17			1.10		
X4H = 16.94				2.31*	
X5H = 16.60					1.00

d .01 = 2.01

*p $<$ .01

In Table 37 we see that X1L and X4L are significantly higher than X1H and X3H, respectively.

TABLE 38. SAS Means for White Subjects Showing HF or LF on the BAT

Group	Means for HF Ss	Means for LF Ss
W1	16.91	11.22
W2	14.50	14.90
W3	9.25	8.00
W4	13.40	9.07
W5	11.57	5.85

From Table 38 we can see that apart from W2, the SAS means for LF subjects are lower than the corresponding SAS means for HF subjects. The SAS mean for LF subjects in W2 is only slightly higher than the SAS mean for HF subjects. The difference between means is particularly marked in the case of W5, where the SAS mean for HF subjects is almost twice as great as the SAS mean for LF subjects. It would appear that, on the whole, LF subjects have more favourable attitudes towards snakes than HF subjects.

TABLE 39. Analysis of Variance Table for SAS Means for White Groups

Source of Variance	SS	df	MS	F
A	229.32	$p - 1 = 1$	229.32	15.73**
B	548.63	$q - 1 = 4$	137.16	9.41**
AB	127.14	$(p-1)(q-1) = 4$	31.79	2.18
W. cell	1312.16	$N - pq = 90$	14.58	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*$p < .05$

**$p < .01$

The analysis of variance data for the SAS means are contained in Table 39. The difference between the combined mean for HF subjects and the combined mean for LF subjects is significant at the .01 level, i.e. the combined mean for LF subjects is significantly lower than the combined mean for HF subjects.

TABLE 40. Differences Between SAS Means for HF and LF White Subjects

	W1L = 11.22	W2L = 14.90	W3L = 8.00	W4L = 9.07	W5L = 5.85
W1H = 16.91	5.69*				
W2H = 14.50		0.40			
W3H = 9.25			1.25		
W4H = 13.40				4.33*	
W5H = 11.57					5.72*

d .01 = 2.65

*p $<$ .01

A completely different picture to that in Table 37 emerges from Table 40. In three of the groups, W1, W4 and W5 the SAS mean for LF subjects is significantly lower (indicating a significantly less negative attitude towards snakes) than the corresponding means for HF subjects. There is a distinct tendency for LF subjects to have less negative attitudes towards snakes than HF subjects.

The findings in Table 37 could be added to Wicker's (1969) already lengthy list of experiments showing very low correlations between attitudes and overt behaviour towards the attitudinal object. In fact, the findings for Xhosa subjects show a tendency for LF subjects to have more negative attitudes towards snakes than HF subjects.

In the case of the White subjects, there is a much higher correlation between negative attitudes towards snakes and avoidance of snakes.

Bandura, Blanchard and Ritter (1969) reported similar findings for American student subjects.

GSRT

TABLE 41. GSRT Means for Xhosa Subjects Showing HF and LF on the BAT

Group	Means for HF Ss	Means for LF Ss
X1	79.75	32.63
X2	48.43	40.65
X3	54.60	60.38
X4	75.46	22.92
X5	41.17	44.36

For three groups, X1, X2 and X4, the GSRT means for LF subjects are lower than the corresponding means for HF subjects. The difference between the GSRT means for LF and HF subjects in X1 and X4 is particularly marked. The GSRT mean for X3 and X5 are slightly higher for LF subjects than for HF subjects. The GSRT means for X3 and X5 are slightly in the "wrong" direction on the basis of BAT scores. The GSRT means for X1, X2 and X4 are in the expected direction on the basis of performance on the BAT.

TABLE 42. Analysis of Variance Table for GSRT Means for Xhosa Groups

Source of Variance	SS	df	MS	F
A	7751.97	p - 1 = 1	7751.97	2.61
B	2831.86	q - 1 = 4	707.97	0.24
AB	12570.89	(p-1)(q-1)=4	3142.72	1.06
W. cell	267227.86	N - pq = 90	2969.20	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .01 = 2.45

*p $<$ .05

**p $<$ .01

While the combined GSRT mean for LF subjects is lower than the combined GSRT mean for HF subjects, the difference is not statistically significant. However, significant differences can be anticipated between the GSRT means for HF and LF subjects in X1 and X4, i.e. significant differences in the expected direction on the basis of BAT scores.

A graph of the GSRT means for HF and LF subjects can be found in Figure 38.

TABLE 43. Differences Between GSRT Means for HF and LF Xhosa Subjects

	X1L = 32.63	X2L = 40.65	X3L = 60.38	X4L = 22.92	X5L = 44.36
X1H = 79.75	47.12 *				
X2H = 48.43		7.78			
X3H = 54.60			5.78		
X4H = 75.46				52.54*	
X5H = 41.17					3.19

d .01 = 38.89

*p $<$ .01

From Table 43 it will be noted that X1L is significantly lower than X1H, and X4L is significantly lower than X4H. These differences are in the "right" direction, i.e. subjects showing HF on the BAT showed significantly more fear on the GSRT than subjects showing LF on the BAT. The differences between the means for X2, X3 and X5 are small and do not approach statistical significance.

TABLE 44. GSRT Means for White Subjects Showing HF and LF on the BAT

Group	Means for HF Ss	Means for LF Ss
W1	38.84	73.12
W2	89.36	51.73
W3	125.50	25.40
W4	20.94	56.72
W5	53.28	45.91

No consistent trend is discernable in the GSRT means for HF and LF subjects. From Table 44 it will be noted that for W1 and W4 the LF means are considerably higher than the HF means. These means are in the "wrong" direction on the basis of BAT scores. For W2, W3 and W5 the GSRT means for HF and LF subjects are in the expected direction, i.e. HF subjects on the BAT showed HF on the GSRT. The difference between the GSRT means for W3 is particularly large.

TABLE 45. Analysis of Variance Table for GSRT Means

Source of Variance	SS	df	MS	F
A	4528.89	p - 1 = 1	4528.89	1.68
B	14533.31	q - 1 = 4	3633.33	1.35
AB	51541.16	(p-1)(q-1)=4	12885.29	4.77
W. cell	243043.18	N - pq = 90	2700.48	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

The combined mean for the LF subjects is not significantly lower than the combined mean for the HF subjects. The significant F ratio for the AB source of variance indicates that there is a significant interaction between level of fear and age.

TABLE 46. Differences Between GSRT Means for HF and LF White Subjects

	W1L = 73.12	W2L = 51.73	W3L = 25.39	W4L = 56.72	W5L = 45.91
W1H = 38.84	34.28				
W2H = 89.36		37.63 *			
W3H = 125.50			100.11*		
W4H = 20.94				35.78	
W5H = 53.28					7.37

d .01 = 36.61

*p $<$ .01

As in the case of Xhosa subjects, the results for two of the five White groups are in the "right" direction. However, it must also be pointed out that for W1 and W4, the differences between means are almost significant in the "wrong" direction, i.e. the GSRT mean for LF subjects on the BAT is almost significantly higher than the GSRT mean for HF subjects on the BAT.

Taking an overall view of the 10 groups, it will be seen that the results for four of the groups show significant differences in the "right" direction. There are no significant differences between GSRT means for HF and LF subjects in the "wrong" direction. For six of the 10 groups no significant differences between HF and LF means were found.

These results could have been anticipated on the basis of previous research reporting an absence of a significant relationship between a behavioural and a physiological measure of fear (e.g. Agras, 1967). These findings tend to support Bernstein and Allen's (1969) contention that fear

is not organized in a unitary way but consists of several components, two of which are an overt behavioural component and a physiological component. At this stage of our knowledge there is no justification for claiming that either a behavioural or a physiological measure is a more valid measure of fear.

FIG. 35. PSES MEANS FOR HF AND LF Ss ON THE BAT.

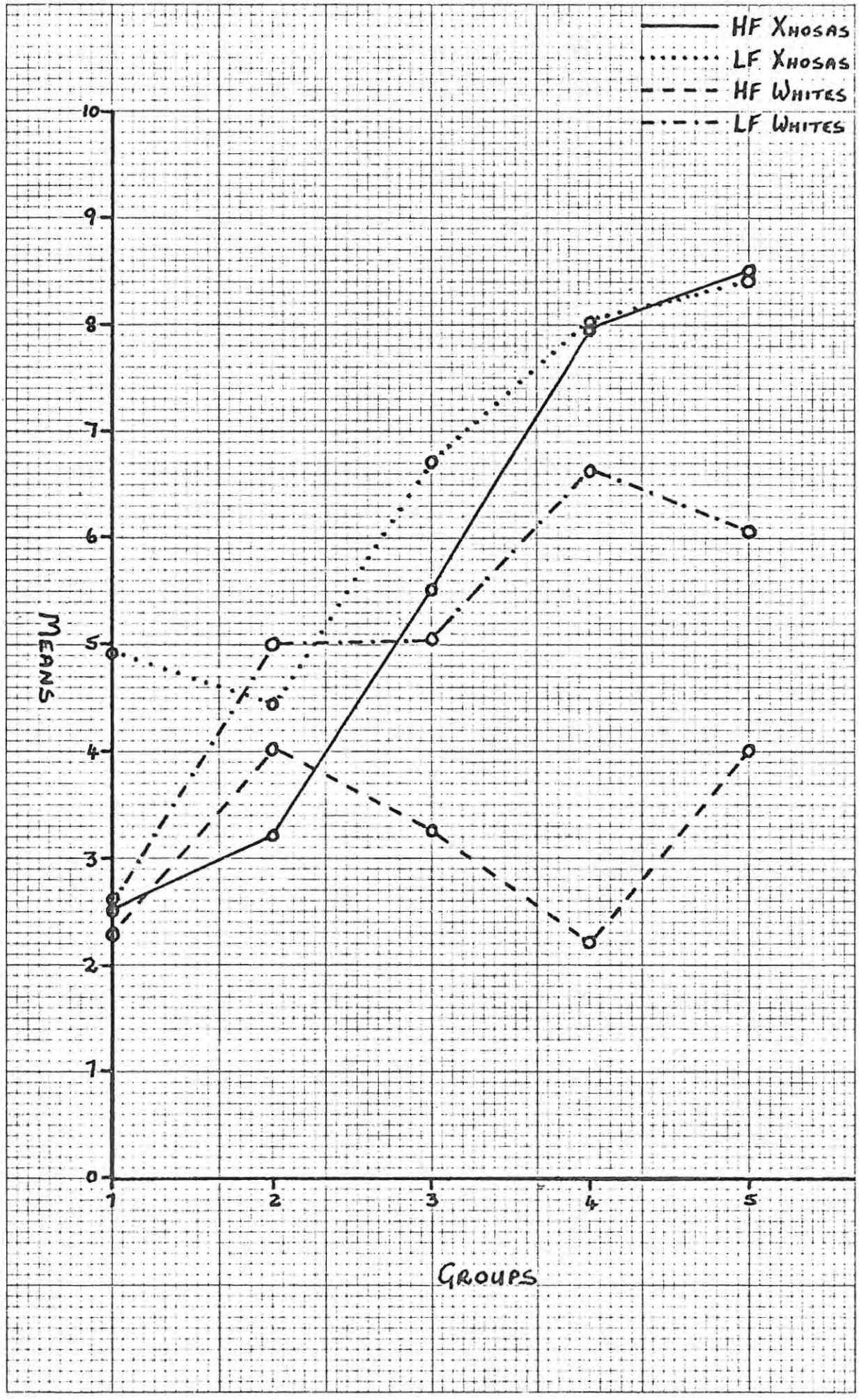


FIG. 36. VSES MEANS FOR HF AND LF Ss ON THE BAT

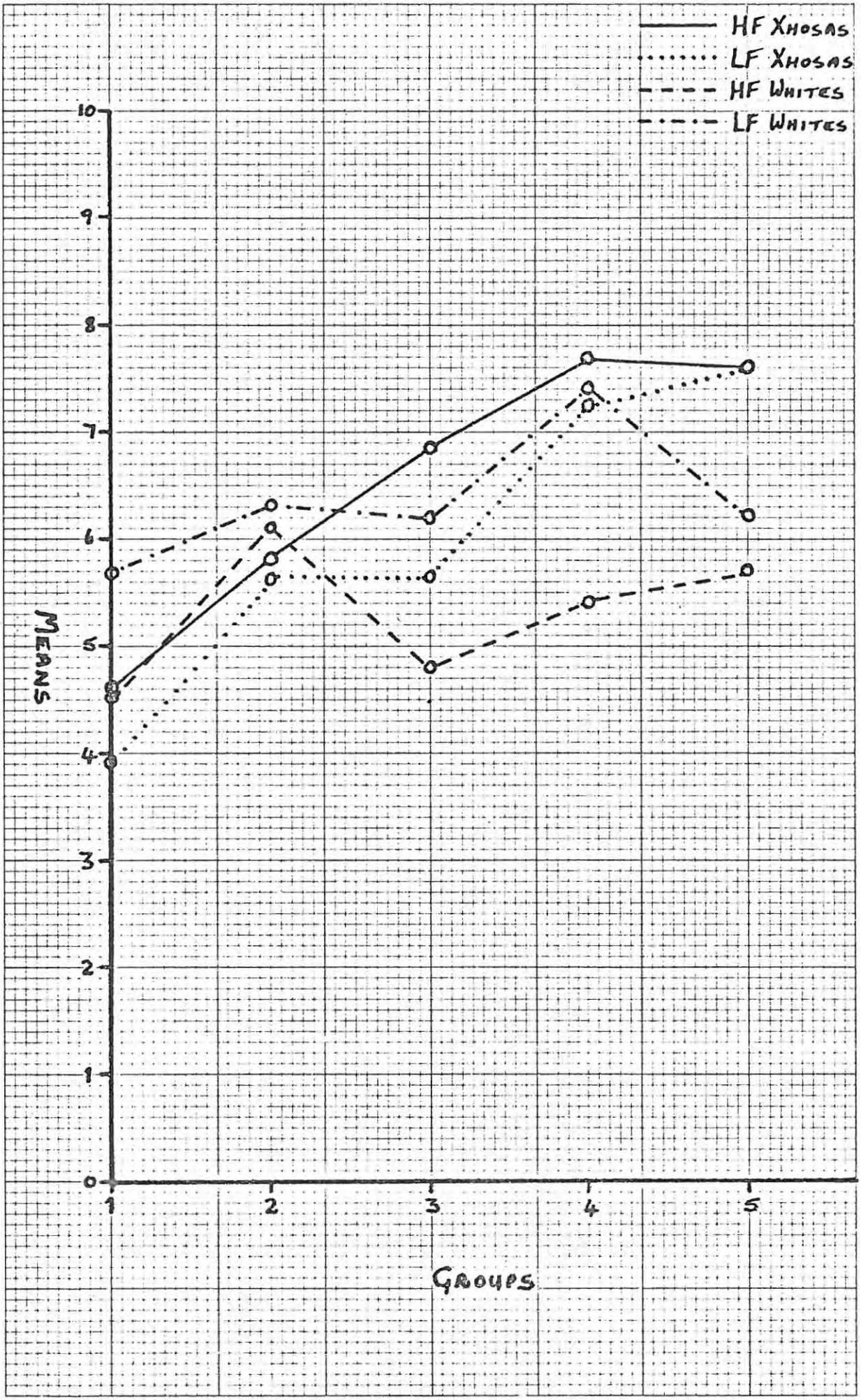


FIG. 37. SAS MEANS FOR HF AND LF Ss ON THE BAT.

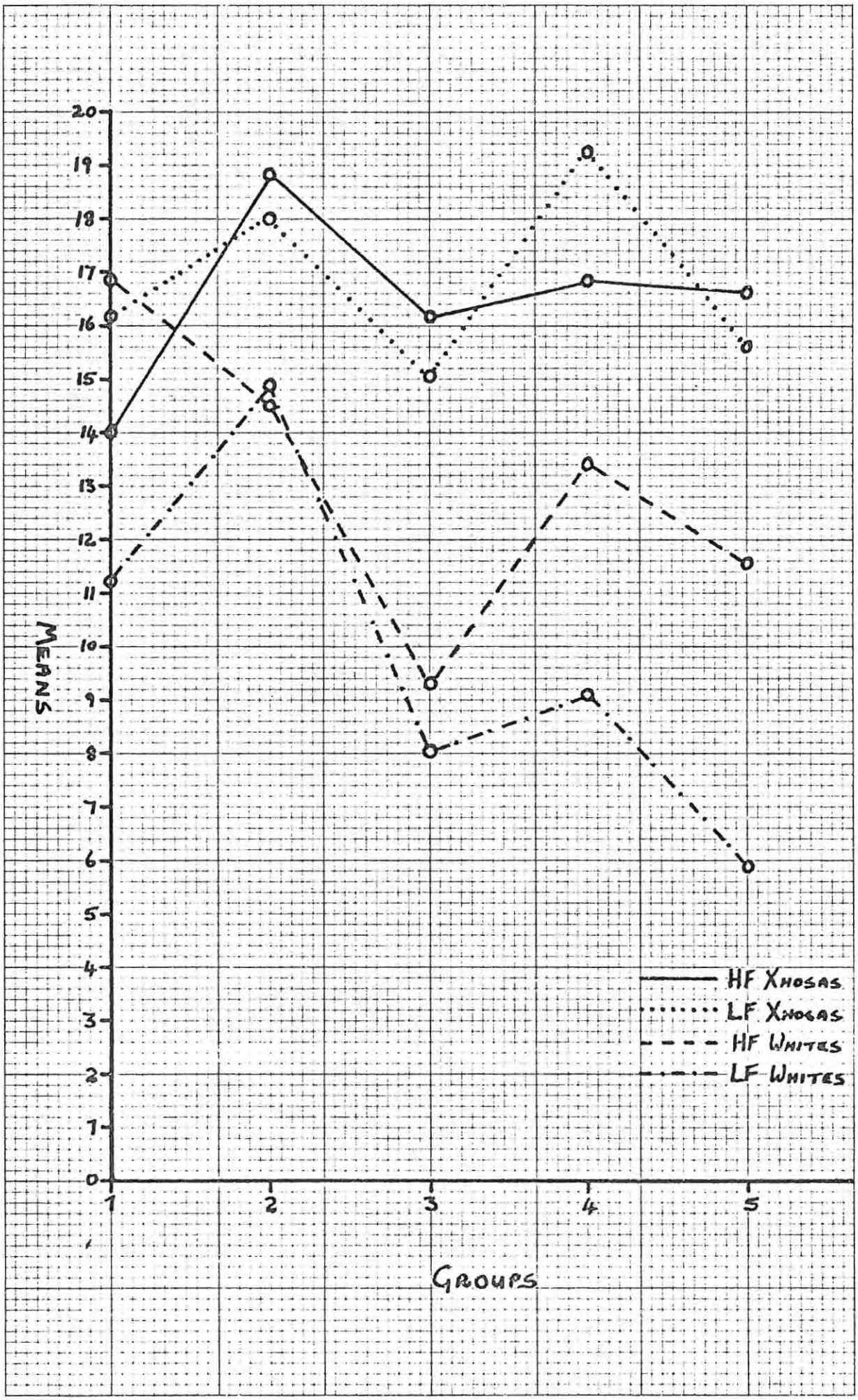
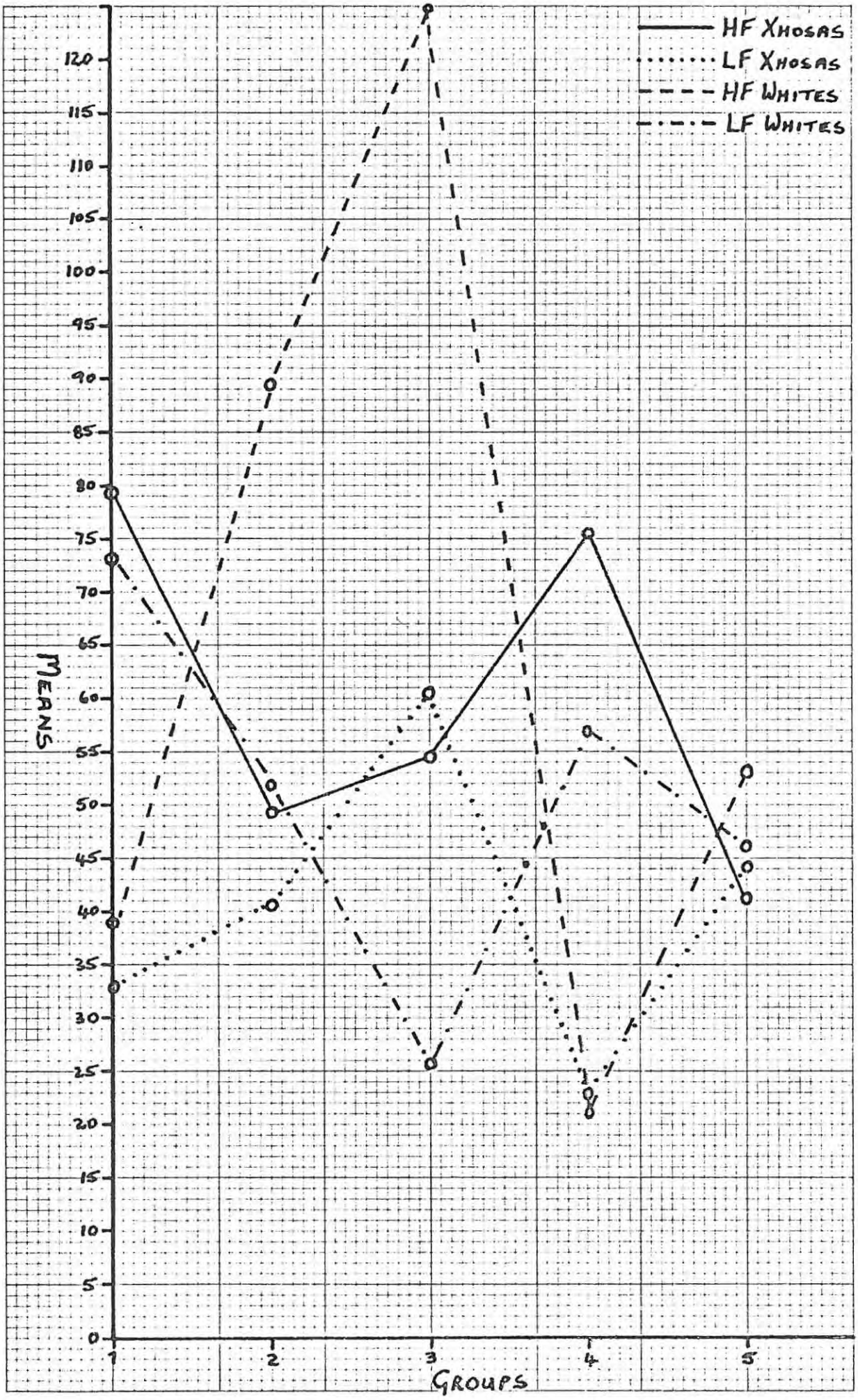


FIG. 38. GSRT MEANS FOR HF AND LF Ss ON THE BAT.



5.43. Analysis of Data Split According to Subjects' Performance on the GSRT

The GSRT means for HF and LF subjects, as measured by the BAT, suggested that the relationship between BAT and GSRT scores is far from perfect. On the basis of these findings a quite different picture could be anticipated if PSES, VSES, SAS and BAT scores were split according to whether the subject showed HF or LF on the GSRT. It is possible that, in many instances, subjects who produced a high percentage increase in GSRs may differ considerably, in scores on the questionnaires, from those subjects exhibiting HF on the BAT.

One of the aims of this analysis of the data, split according to the subjects' performance on the GSRT, was to provide further information on the relationship between the BAT and the GSRT. A comparison will also be possible between the relationship of the BAT scores and the questionnaire scores and the relationship between the GSRT and the questionnaire scores.

In order to obtain a more or less equal split of the GSRT scores, the criterion for HF on the GSRT was a 30% or greater increase in GSRs. The criterion for LF on the GSRT was a 29% or smaller increase in GSRs.

The procedure adopted for analyzing the data split in this way was exactly the same as that employed for the data split according to BAT scores. Four analysis of variances were performed on the Xhosa subjects' PSES, VSES, SAS and BAT scores, for HF and LF subjects on the GSRT. The same procedure was adopted for the five White groups.

In the analysis of variance tables to be presented in this section, the A source of variance will designate the variance between the combined means for HF and LF subjects in the five age-groups. The B source of variance will be the variance between the means for the age-groups. The AB source of variance is the interaction between the level of fear as

determined by the GSRT and age.

A paired comparison of means was performed to indicate exactly the groups for which there are significant differences between HF and LF means. It is essential to gain this type of information on the relationship between the BAT and the GSRT. In the previous section it was revealed that there are no significant differences between the combined GSRT means for both Xhosas and Whites showing HF or LF on the BAT. However, a number of large differences between the means for individual groups were noted. The significance of the differences between paired means for each of the measures will be investigated in this section.

PSES

TABLE 47. PSES Means for Xhosa Subjects Showing HF and LF on the GSRT

Group	Means for HF Ss	Means for LF Ss
X1	4.70	3.20
X2	2.82	5.78
X3	6.73	5.89
X4	7.91	8.00
X5	8.70	8.20

For three of the groups, X1, X3 and X5, the PSES means for the LF subjects are lower than the corresponding means for the HF groups. On the other hand, the LF means for X2 and X4 are higher than the PSES means for HF subjects. The difference between means is particularly pronounced in X2 where the PSES mean for LF subjects is almost twice as great as the mean for HF subjects.

A graph of these means can be found in Figure 39.

TABLE 48. Analysis of Variance Table for PSES Means for Xhosa Groups

Source of Variance	SS	df	MS	F
A	0.55	p - 1 = 1	0.05	0.01
B	334.62	q - 1 = 4	83.66	12.71
AB	59.45	(p-1)(q-1) = 4	14.86	2.23
W. cell	592.57	N - pq = 90	6.58	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p < .05

**p < .01

The combined PSES means for HF and LF subjects do not differ significantly.

TABLE 49. Differences Between PSES Means for HF and LF Xhosa Subjects

	X1L = 3.20	X2L = 5.78	X3L = 5.89	X4L = 8.00	X5L = 8.20
X1H = 4.70	1.50				
X2H = 2.82		2.96*			
X3H = 6.73			0.84		
X4H = 7.91				0.09	
X5H = 8.70					0.50

d .01 = 1.62

* p < .01

Only one significant difference is to be found in Table 49, i.e. between the means for X2. The PSES mean for LF subjects in X2 is significantly higher than the PSES mean for HF subjects in X2. These findings are very similar to those in Table 25 for BAT split scores.

TABLE 50. PSES Means for White Subjects Showing HF and LF on the GSRT

Group	Means for HF Ss	Means for LF Ss
W1	2.57	1.67
W2	4.56	4.45
W3	3.57	5.31
W4	5.60	5.40
W5	4.75	6.25

Generally, the differences between HF and LF means in Table 50 are slight. The PSES means for LF subjects are lower than the corresponding means for HF subjects in W1, W2 and W4. Subjects showing LF on the GSRT reported more intense personal aversive experiences of snakes than HF subjects in groups W3 and W5.

TABLE 51. Analysis of Variance Table for PSES Means for White Groups

Source of Variance	SS	df	MS	F
A	3.86	p - 1 = 1	3.86	0.73
B	142.94	q - 1 = 4	35.74	6.74**
AB	24.85	(p-1)(q-1) = 4	6.22	1.17
W. cell	476.75	N - pq = 90	5.30	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

There is no significant difference between the combined PSES mean for LF subjects and the combined PSES mean for HF subjects. As in the case of the PSES data split according to BAT scores, in Table 51, it will

be noted that the B source of variance produces a significant F ratio. There is at least one significant difference between PSES means across the five age-groups.

TABLE 52. Differences Between PSES Means for HF and LF White Subjects

	W1L = 1.67	W2L = 4.46	W3L = 5.31	W4L = 5.40	W5L = 6.25
W1H = 2.57	0.90				
W2H = 4.56		0.10			
W3H = 3.57			1.74*		
W4H = 5.60				0.20	
W5H = 4.75					1.50*

d .01 = 1.50

*p $<$ .01

The trend apparent in Table 28 (BAT split scores) is the same as that found in Table 52 where PSES scores are split according to HF or LF on the GSRT. In Table 52 W3L and W5L are significantly higher than W3H and W5H, respectively.

Taking an overall view of the PSES means for HF and LF subjects on the GSRT, we find no single instance of HF subjects in a group scoring significantly higher than the LF subjects in the same group. However, in three of the 10 groups LF subjects scored significantly higher on the PSES than HF subjects. These findings are remarkably similar to those for the BAT split scores.

These findings mitigate strongly against personal aversive experiences, as measured by the PSES, being a key factor in the development of a fear of snakes. This is supported by both the BAT and the GSRT split data.

VSES

TABLE 53. VSES Means for Xhosa Subjects Showing HF and LF on the GSRT

Group	Means for HF Ss	Means for LF Ss
X1	3.40	5.00
X2	6.27	5.00
X3	5.27	6.89
X4	7.82	7.33
X5	6.90	8.30

The trend apparent in Table 53 is much the same as that apparent in Table 47, which contains the PSES means for Xhosa subjects. From Table 53 it will be noted that for three of the groups, X1, X3 and X5, the VSES mean for LF subjects is higher than the VSES mean for HF subjects. The trend is reversed for X2 and X4 where the VSES means for HF subjects are higher than the VSES means for LF subjects.

Figure 40 is a graph of these means.

TABLE 54. Analysis of Variance Table for VSES Means for Xhosa Subjects

Source of Variance	SS	df	MS	F
A	8.12	p - 1 = 1	8.12	1.40
B	162.67	q - 1 = 4	40.67	7.01**
AB	36.54	(p-1)(q-1) = 4	9.14	1.58
W. cell	522.28	N - pq = 90	5.80	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .01 = 2.45

*p $<$ .05

**p $<$ .01

The combined VSES mean for LF subjects is higher than the combined VSES mean for HF subjects, but the difference is not statistically significant.

TABLE 55. Differences Between VSES Means for HF and LF Xhosa Subjects

	X1L = 5.00	X2L = 5.00	X3L = 6.89	X4L = 7.33	X5L = 8.30
X1H = 3.40	1.60*				
X2H = 6.27		1.27			
X3H = 5.27			1.62*		
X4H = 7.82				0.49	
X5H = 6.90					1.40

α .01 = 1.52

*p $<$ .01

It will be seen in Table 55 that, for two groups, X1 and X3, the VSES mean for LF subjects is significantly higher than the VSES mean for LF subjects. No significant differences were found when the VSES data for Xhosa subjects was split according to BAT Scores (see Table 31).

TABLE 56. VSES Means for White Subects Showing HF or LF on the GSRT

Group	Means for HF Ss	Means for LF Ss
W1	4.93	5.33
W2	5.78	6.55
W3	5.43	6.15
W4	7.20	6.60
W5	5.67	6.63

Apart from W4, in each of the other groups the VSES mean for LF subjects is slightly higher than the corresponding mean for HF subjects.

A graph of these means can be found in Figure 40.

TABLE 57. Analysis of Variance Table for VSES Means for White Subjects

Source of Variance	SS	df	MS	F
A	4.77	p - 1 = 1	4.77	1.42
B	30.95	q - 1 = 4	7.74	2.30
AB	7.21	(p-1)(q-1) = 4	1.80	0.54
W. cell	302.49	N - pq = 90	3.36	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

From Table 57 it will be seen that the F ratio for the A source of variance is low and does not approach significance.

TABLE 58. Differences Between VSES Means for HF and LF White Subjects

	W1L = 5.33	W2L = 6.55	W3L = 6.15	W4L = 6.60	W5L = 6.63
W1H = 4.93	0.40				
W2H = 5.78		0.77			
W3H = 5.43			0.72		
W4H = 7.20				0.60	
W5H = 5.67					0.96

d .01 = 1.20

*p $<$ .01

The differences between the means in Table 58 are small and do not approach statistical significance. However, when the VSES scores were split according to performance on the BAT, significant differences between the means for two of the groups were found (Table 34).

In the 10 groups there is no single instance of the VSES mean for HF subjects being higher than the VSES mean for LF subjects. On the other hand, the LF means for two groups are significantly higher than the VSES means for HF subjects.

These results confirm the conclusion drawn after the comparison of the VSES means for LF and HF subjects on the BAT. Vicarious aversive experiences of snakes per se does not appear to be a significant independent variable in the fear of snakes as measured by the BAT and the GSRT.

SAS

TABLE 59. SAS Means for Xhosa Subjects Showing HF and LF on the GSRT

Group	Means for HF Ss	Means for LF Ss
X1	15.40	15.20
X2	18.18	18.22
X3	15.45	15.33
X4	17.27	17.56
X5	16.50	15.70

The SAS means for HF and LF subjects in the same group are remarkably similar. The largest difference between corresponding HF and LF means is 0.80 in X5.

A graph of these means can be found in Figure 41.

TABLE 60. Analysis of Variance Table for SAS Means for Xhosa Subjects

Source of Variance	SS	df	MS	F
A	0.63	p - 1 = 1	0.63	0.07
B	130.30	q - 1 = 4	32.58	3.70**
AB	3.23	(p-1)(q-1) = 4	0.81	0.09
W. cell	792.92	N - pq = 90	8.81	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

Because of the small differences between SAS means a significant F ratio for the A source of variance could not be expected.

TABLE 61. Differences Between SAS Means for HF and LF Xhosa Subjects

	X1L = 15.20	X2L = 18.22	X3L = 15.33	X4L = 17.56	X5L = 15.70
X1H = 15.40	0.20				
X2H = 18.18		0.04			
X3H = 15.46			0.13		
X4H = 17.27				0.29	
X5H = 16.50					1.20

d .01 = 1.88

* p $<$ .01

Differences between paired HF and LF means are very low and do not approach statistical significance. These findings are contrary to those found for the SAS data split according to BAT data (Table 37), where differences between the SAS means for two groups were significant.

TABLE 62. SAS Means for White Subjects Showing HF and LF on the GSRT

Group	Means for HF Ss	Means for LF Ss
W1	13.71	15.83
W2	14.78	14.64
W3	10.71	6.92
W4	9.80	10.50
W5	7.58	8.25

There is no discernable trend in Table 62. For three groups, W1, W4 and W5, the SAS mean for LF subjects is higher than the mean for HF subjects. In the case of W2 and W3, the SAS mean for LF subjects is lower than the mean for HF subjects. A quite different picture was produced in the SAS data split according to performance on the BAT.

TABLE 63. Analysis of Variance Table for SAS Means for White Subjects

Source of Variance	SS	df	MS	F
A	0.18	p - 1 = 1	0.18	0.01
B	797.55	q - 1 = 4	199.39	11.16**
AB	92.57	(p-1)(q-1) = 4	23.14	1.30
W. cell	1608.66	N - pq = 90	17.87	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

There is no significant difference between the combined SAS mean for HF subjects and the combined SAS mean for LF subjects.

TABLE 64. Differences Between SAS Means for HF and LF White Subjects

	X1L = 15.83	X2L = 14.64	X3L = 6.92	X4L = 10.50	X5L = 8.25
X1H = 13.71	2.12				
X2H = 14.78		0.14			
X3H = 10.71			3.79*		
X4H = 9.80				0.70	
X5H = 7.58					0.67

d .01

* p $<$ .01

The SAS mean for LF subjects in X3 is significantly lower than the SAS mean for HF subjects in X3. In Table 40 the means for three groups showed this significant trend, i.e. for BAT split data.

Out of the 10 groups only the means for X3 showed a significant difference. From the findings it can be again affirmed that the extent of the subjects' erroneous beliefs about snakes did not significantly influence the level of the subjects' fear of snakes either as measured by the BAT or the GSRT. The findings reviewed by Wicker (1969) concerning the low correlation between attitudes and overt behaviour would seem to extend to the correlation between a physiological measure of fear and attitudes held about the fear stimulus, as demonstrated by this experiment.

BAT

TABLE 65. BAT Means for Xhosa Subjects Showing HF and LF on the GSRT

Groups	Means for HF Ss	Means for LF Ss
X1	10.60	15.10
X2	13.82	15.22
X3	14.09	14.56
X4	9.00	10.33
X5	12.00	12.40

The BAT means for HF subjects are in each case lower (indicating higher fear) than the corresponding LF means. While these results are in the "right" direction, it should be noted that, except for W1, the differences between the corresponding HF and LF means are slight.

A graph of these means can be found in Figure 42.

TABLE 66. Analysis of Variance Table for BAT Means for Xhosa Subjects

Source of Variance	SS	df	MS	F
A	65.25	p - 1 = 1	65.25	2.33
B	306.56	q - 1 = 4	76.64	2.74*
AB	55.89	(p-1)(q-1) = 4	13.97	0.50
W. cell	2516.02	N - pq = 90	27.96	

A .01 = 6.85; A .05 = 3.92

B & AB .01 = 3.48; B & AB .05 = 2.45

*p $<$ .05

**p $<$ .01

While the combined BAT mean for LF subjects is higher than the combined BAT mean for HF subjects, the difference is not significant.

TABLE 67. Differences Between BAT Means for HF and LF Xhosa Subjects

	X1L = 15.10	X2L = 15.22	X3L = 14.56	X4L = 10.33	X5L = 12.40
X1H = 10.60	4.50*				
X2H = 13.82		1.40			
X3H = 14.09			0.47		
X4H = 9.00				1.33	
X5H = 12.00					0.40

d .01 = 3.34

*p $<$ .01

The BAT mean for LF subjects in X1 is significantly higher (significantly less fear) than the BAT mean for HF subjects. The differences between the means for the other four groups are slight and do not approach significance. It is interesting to note that in Table 43 the difference between the GSRT means for LF and HF in X1 is also significant and is in the same direction.

TABLE 68. BAT Means for White Subjects Showing HF or LF on the GSRT

Groups	Means for HF Ss	Means for LF Ss
W1	12.07	9.17
W2	9.89	12.46
W3	13.29	17.77
W4	16.30	14.20
W5	13.75	15.50

As opposed to the BAT means for Xhosa subjects, no distinct trend in BAT means for White subjects emerges from Table 68. The means for W1 and W4 are in the "wrong" direction, i.e. the BAT means for subjects showing HF on the GSRT are higher (indicating less fear) than the corresponding BAT LF means.

A graph of these means can be found in Figure 42.

TABLE 69. Analysis of Variance Table for BAT Means for White Subjects

Source of Variance	SS	df	MS	F
A	13.48	p - 1 = 1	13.48	0.59
B	414.53	q - 1 = 4	103.63	4.54**
AB	185.89	(p-1)(q-1)=4	46.47	2.04
W. cell	2055.06	N - pq = 90	22.83	

A .01 = 6.85; A .05 = 3.92
B & AB .01 = 3.48; B & AB .05 = 2.45
*$p < .05$
**$p < .01$

The F ratio for the A source of variance is not significant. Therefore, while the combined BAT mean for LF subjects is higher than the combined BAT mean for HF subjects, the difference is not significant.

TABLE 70. Differences Between BAT Means for HF and LF White Subjects

	W1L = 9.17	W2L = 12.46	W3L = 17.77	W4L = 14.20	W5L = 15.50
W1H = 12.07	2.90				
W2H = 9.89		2.57			
W3H = 13.29			4.48*		
W4H = 16.30				2.10	
W5H = 13.75					1.75

d .01 = 3.13

* p $<$ .01

No consistent, significant trend is apparent in Table 70. The significant difference between W3H and W3L is in the "right" direction. However, the difference between W1H and W1L is nearly significant at the .01 level and is in the opposite direction, i.e. the BAT mean for LF subjects is almost significantly lower than the BAT mean for HF subjects.

Taking into consideration both the Xhosa and the White subjects it will be noted that in only two of the 10 groups are there significant differences between LF and HF means in the "right" direction. The finding that the BAT and GSRT scores covaried significantly for only one-fifth of the groups, supports the findings of previous researchers (e.g. Agras, 1967) on the low correlation between behavioural and physiological measures of fear.

FIG. 39. PSES MEANS FOR HF AND LF Ss ON THE GSRT.

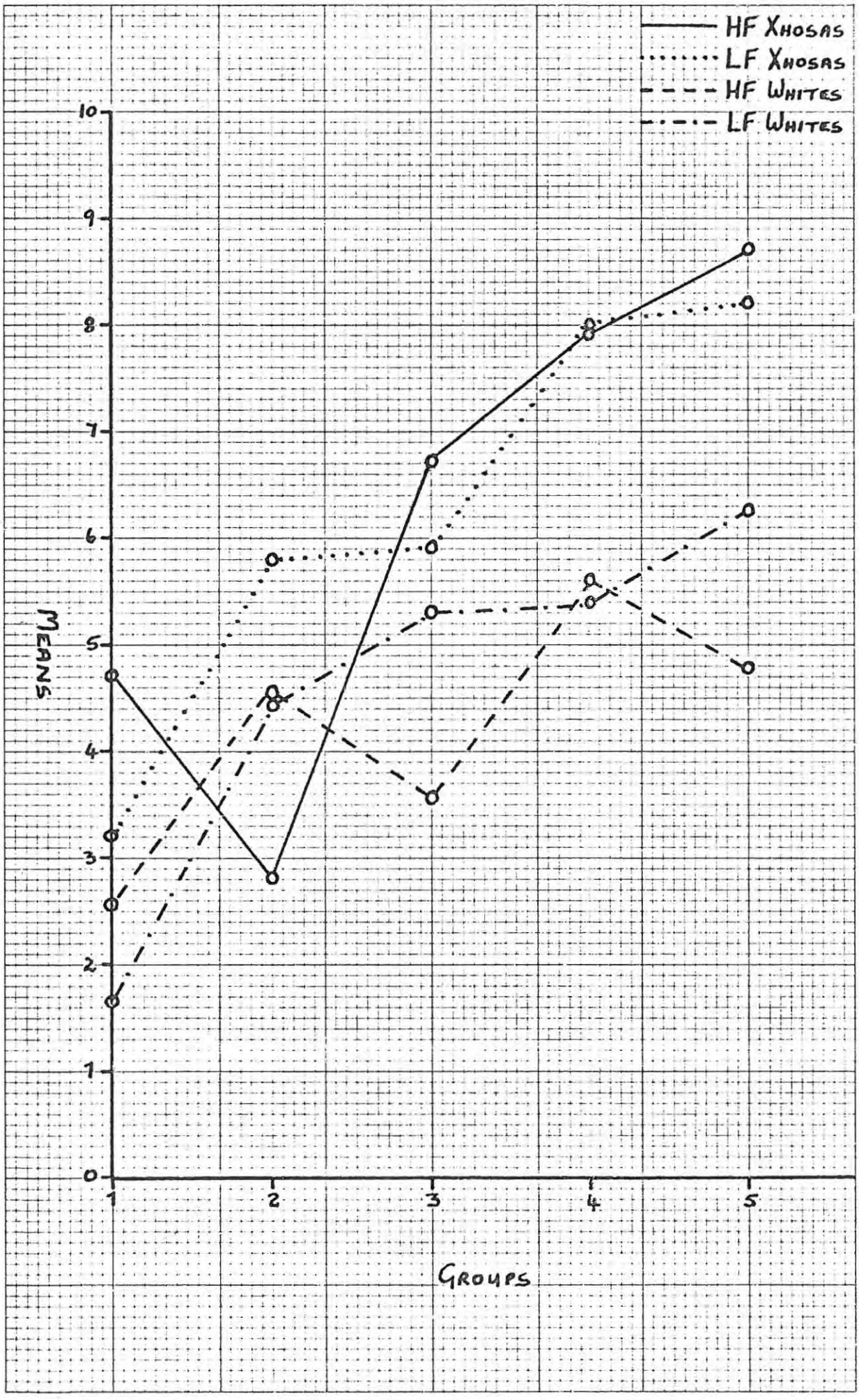


FIG. 40. VSES MEANS FOR HF AND LF Ss ON THE GSRT.

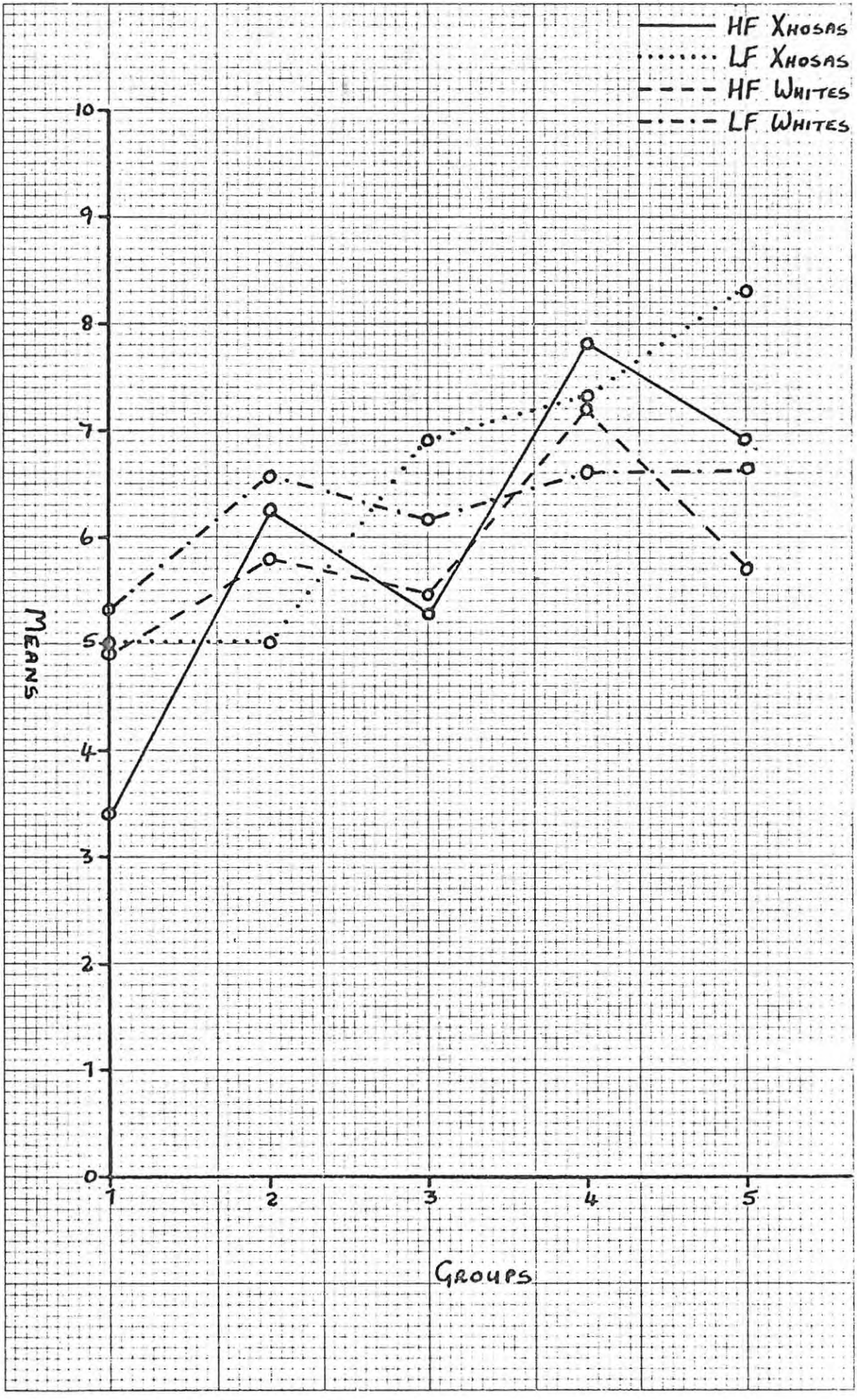


FIG. 41. SAS MEANS FOR HF AND LF Ss ON THE GSRT.

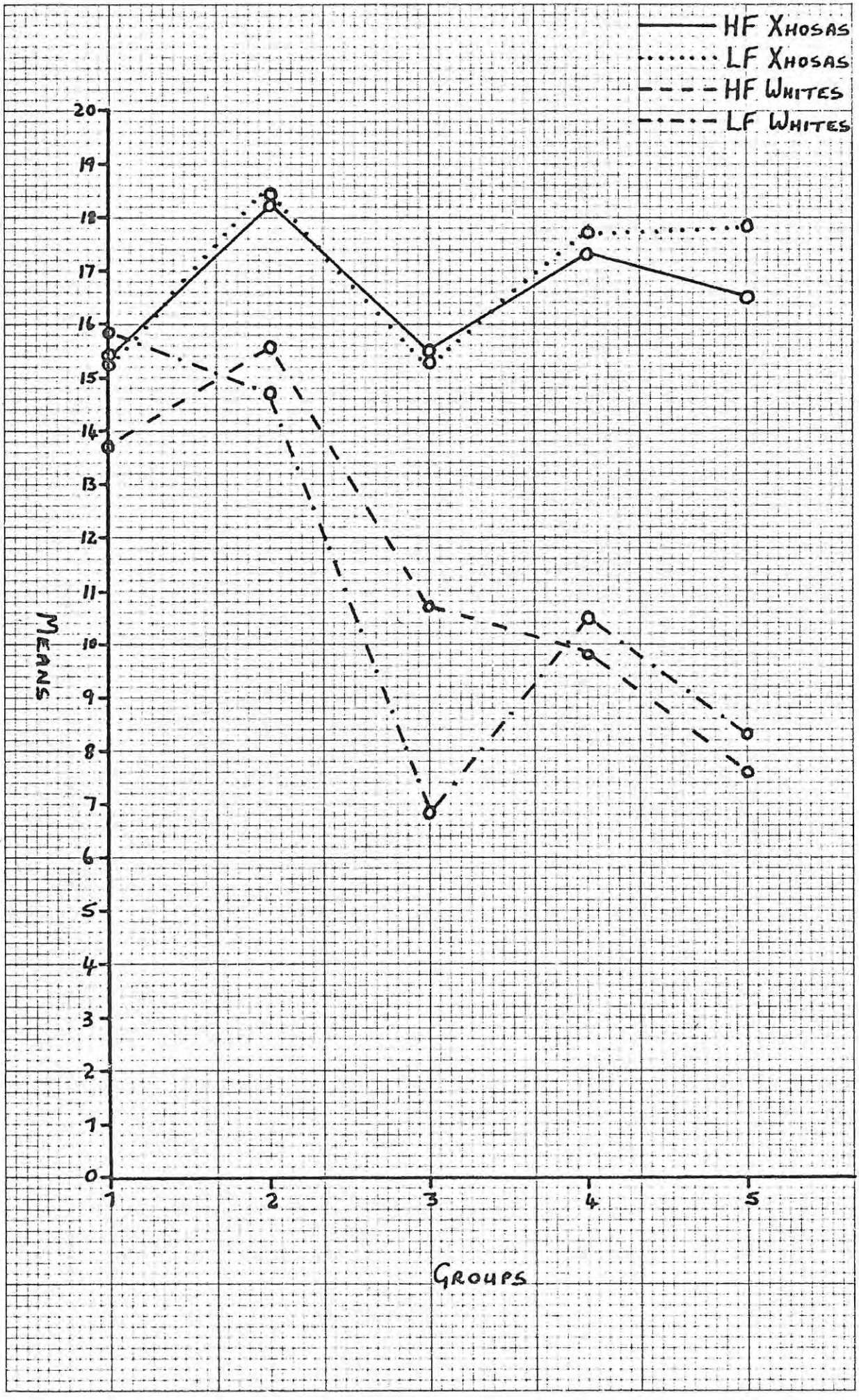
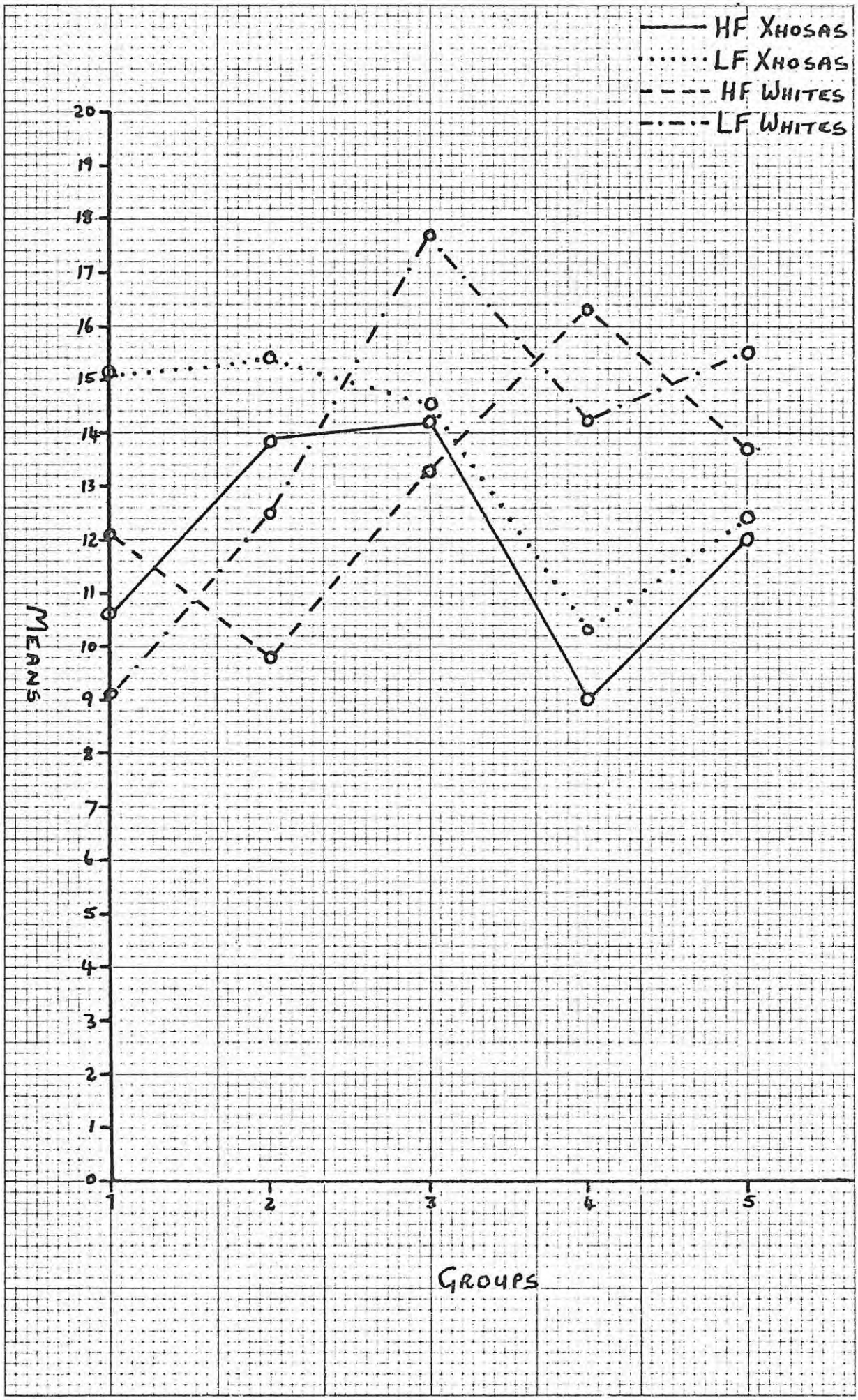


FIG. 42. BAT MEANS FOR HF AND LF Ss ON THE GSRT.



5.44. Correlation between the BAT and GSRT

In the preceding discussion of the results it was stated that there appeared to be no significant relationship between scores on the BAT and the GSRT.

An analysis of variance of the GSRT means for subjects showing either HF or LF on the BAT revealed that there was no significant difference between the overall means for HF and LF subjects. The same finding was produced by the analysis of variance of the BAT means for subjects showing HF or LF on the GSRT. The paired comparison of means for HF and LF subjects in each of the 10 groups revealed very few significant differences between HF and LF means.

The Pearson Correlation Coefficient was calculated to determine the relationship between the BAT and the GSRT. As high BAT scores indicated LF and high GSRT scores indicated HF, a high negative correlation would have demonstrated that subjects tended to show a similar intensity of fear on both fear measures. The correlation (r) was, in fact, -0.14. By substituting this value of r in an equation for t a value of 1.96 was obtained. This t value is significant at the 0.025 level. Therefore, there was a slight but significant correlation between the BAT and GSRT scores.

5.45. Differences Between the Means for Rural and Urban Subjects

The 20 boys in W3 were drawn from a boarding-school hostel. Ten of the boys had lived for at least five years on a farm and returned to a farm for their holidays. This sub-group was designated "rural". The other 10 boys in W3 met the criterion for "urban" subjects, i.e. they had lived permanently in an urban area and had not spent longer than one month continuously in a rural area at any time during their lives.

In an attempt to determine whether there were any significant differences between the scores for rural and urban subjects on the five measures, the scores were analyzed by means of a t- Test. The formula used to obtain a value for t was that advocated by Edwards (1968) for groups with unequal variances and equal numbers of subjects.

From Table 71 it will be noted that none of the t values approaches significance at the .05 level. It can, therefore, be concluded that in W3 there are no significant differences between the means for rural and urban subjects on the five measures used.

TABLE 71. t - Values for the Differences Between the Means for Rural and Urban Subjects

Measure	Urban Mean	Rural Mean	t
PSES	8.80	10.00	0.66
VSES	12.20	11.40	0.68
SAS	8.40	8.10	0.33
BAT	16.50	15.90	0.52
GSRT	48.26	40.73	0.18

t .01 = 2.54 ; 7 .05 = 1.73

*p < .05

**p < .01

Pratt (1945) compared his findings on the fears of American rural children with those of Jersild (1935) for American urban children. Pratt stated that the percentage of rural children reporting a fear of one or more animals was considerably higher than the percentage of urban children reporting such fears.

In the present experiment, the number of rural and urban subjects for whom comparisons on the five measures were made is small and represents only one age-group. Furthermore, the "rural" subjects were scholars

at a boarding school in an urban area, and were, thus, not entirely "rural" in the normal sense of the term. However, the finding of extremely low *t* values is of interest. There is a striking similarity between the scores of rural and uroan subjects in W3 on each of the five measures. These findings, for the reasons mentioned above, cannot be regarded as ruling out the possibility of there being significant differences between rural and urban subjects in the fear of snakes.

5.46. Chi-Square Analysis of the Questionnaires

Xhosa versus White Subjects

The differences between the mean scores for Xhosa and White subjects on the PSES, VSES and SAS were analyzed in preceding sections of this chapter. During the conducting of the experiment it became quite evident that while Xhosa and White subjects, in the same age-group, differed markedly in their responses to certain questionnaire items, responses to others were very similar. It was decided to analyze each of the three questionnaire scales, item by item, to determine whether significant differences existed between the total number of Xhosa subjects giving an affirmative answer to a particular item and the number of White subjects responding in the affirmative to the same item.

The significance of the differences between the responses of Xhosa and White subjects to each item of the PSES and VSES was tested by means of a Chi-Square (X^2) Test for two independent samples with two classes. Siegel (1956) stated that this test is appropriate for testing the hypothesis that "two groups differ with respect to some characteristic and, therefore, with respect to the relative frequency with which group members fall in several categories."

The formula used to calculate the X^2 for each scale item of the PSES and VSES was that proposed by Edwards (1968). An example of the

contingency tables for the PSES and VSES items is presented in Tables 72 and 73.

TABLE 72. Observed Frequencies for Xhosa and White Subjects on Item 1 of the VSES

	No. of Pos. Ans.	No. of Neg. Ans.	
Xhosa Ss	51	49	100
White Ss	77	23	100
	128	72	200

TABLE 73. Expected Frequencies for Xhosa and White Subjects on Item 1 of the VSES

	No. of Pos. Ans.	No. of Neg. Ans.	
Xhosa Ss	64	36	100
White Ss	64	36	100
	128	72	200

Because the responses to the SAS were classified into three categories, Edwards' (1968) $\underline{X}^2$ formula for two or more samples with $\underline{c}$ classes was used.

All $\underline{X}^2$ calculations were performed by electronic computer.

PSES

TABLE 74. $\underline{X}^2$ Values for Items of the PSES

Item	Xhosa Affirm.	White Affirm.	Xhosa Neg.	White Neg.	$\underline{X}^2$
1	28	78	72	22	50.18*
2	81	85	19	15	0.57
3	54	58	46	42	0.32
4	69	57	31	43	3.09
5	57	48	43	52	1.62
6	64	36	39	61	12.51*
7	57	15	43	85	38.28*
8	50	7	50	93	45.37*
9	18	2	82	98	14.22*
10	2	3	98	97	0.21

X^2 .01 = 6.64

* $p < .01$

The $\underline{X}^2$ for Items 1, 6, 7, 8 and 9 are significant at the .01 level. For items 6, 7, 8 and 9 Xhosa subjects gave significantly more positive answers than White subjects, i.e. significantly more Xhosa than White subjects claimed to have experienced the type of personal aversive experiences described by these items. The number of Xhosa and White subjects who claimed to have been bitten by a snake (Item 10) did not differ significantly.

It is interesting to note that the $\underline{X}^2$ value for Item 1 is highly significant. Significantly more White than Xhosa subjects claimed to have seen a live snake in captivity. This finding was entirely expected in view of the greater opportunities accorded Whites to visit zoos and snake-parks.

It was mentioned in 5.1. that some of the subjects in the two youngest age-groups tended to answer "Yes" to questions which they could

not justify when asked for details of the claimed experiences. An atmosphere was created in the experimental situation which permitted several subjects to reverse their over-hasty claims without a loss of face. The significantly higher number of Whites than Xhosas who claimed to have seen a live snake in captivity is an entirely expected finding and demonstrates that subjects were prepared to acknowledge the lack of even the most innocuous encounter with a snake.

VSES

TABLE 75. $\underline{X}^2$ Values for Items of the VSES

Item	Xhosa Affirm.	White Affirm.	Xhosa Neg.	White Neg.	$\underline{X}^2$
1	51	77	49	23	14.67*
2	35	62	65	38	14.59*
3	31	59	69	41	15.84*
4	63	79	37	21	6.22
5	5	66	95	34	81.25*
6	75	61	25	39	4.50
7	21	38	79	62	6.95*
8	23	16	77	84	1.56
9	24	8	76	92	9.52*
10	6	1	94	99	3.70

X^2 .01 = 6.64

* $p < .01$

Significantly more White than Xhosa subjects answered Items 1, 2 and 3 in the affirmative. These items deal with the subjects' awareness of other people's fear of snakes. It was indeed unexpected that half of the Xhosa subjects claimed that they knew of no person who was unduly afraid of snakes.

The highly significant $\underline{X}^2$ for Item 5 was entirely expected, i.e. significantly more White than Xhosa subjects claimed to have read a book or seen a film in which someone had been harmed by a snake. The possibility exists that the type of question in the VSES motivates the subject to exaggerate his experiences. An item such as Item 5 provides a useful gauge to estimate whether this is, in fact, happening. The finding that 95% of the Xhosa subjects admitted having never read a book or seen a film in which someone was harmed by a snake, reveals that subjects were not merely responding in the affirmative to each item on the VSES because of some extraneous variable such as social desirability.

Significantly more Xhosa than White subjects claimed that they had seen someone being attacked by a snake. However, significantly more Whites than Xhosas stated that they knew someone who had been bitten by a snake.

SAS

TABLE 76. $\underline{X}^2$ Values for Items of the SAS and the Number of Xhosas and Whites Choosing Each Possible Response

Item	A	B	C	A	B	C	$\underline{X}^2$
1	8	91	1	29	38	33	63.81*
2	84	12	4	26	59	15	68.07*
3	40	49	11	39	49	12	0.06
4	90	6	4	39	15	46	59.30*
5	8	80	12	4	31	65	59.44*
6	85	13	29	35	56	9	52.08*
7	1	98	1	24	69	7	30.70*
8	95	5	0	64	11	25	33.29*
9	39	61	0	37	60	3	3.06
10	72	28	0	32	61	7	34.62*

X^2 .01 = 9.21

*p $<$ .01

Except for Items 3 (Beautiful - Ugly) and 9 (Firm - Slippery), Xhosa subjects expressed significantly more negative attitudes towards snakes than did the White subjects on each of the other eight items.

The finding that significantly more Xhosa than White subjects regarded snakes as being evil was not surprising in view of the role of the snake in Xhosa witchcraft. One Xhosa subject stated during the GSRT, "Andifuni kiyonga kule nyoka ngoba yinto ka Satana." ("I don't want to look at the snake because it is a thing of Satan"). Xhosa subjects were extremely reticent to discuss this particular belief about snakes. The Xhosa research assistant confirmed that the belief that the snake is associated with Satan is widely held by Xhosas.

The probable advantages that Whites have in obtaining factual information about snakes have already been mentioned. This variable probably accounts for most of the differences on the SAS between the older Xhosa and White subjects. An intriguing question is how these totally erroneous beliefs about snakes arise in the first place. It is tempting to propose highly imaginative explanations along the lines of some psychoanalysts who regard the fear of snakes as reflecting phallic anxieties (e.g. Fenichel, 1946). Morris and Morris (1965) succumbed to the temptation of explaining why the snake should be regarded as dirty and slimy in psychoanalytic terms. A more likely explanation is in terms of erroneous information gleaned from peers and parents.

The Age Variable

The question to be answered in this section is whether there are significant differences across the five age-groups in the number of subjects answering in the affirmative or the negative to each item on the PSES and VSES. Is there a change with age in responses to all the items on the SAS or only to a certain number of the items?

The analysis of variance and the paired comparison of the means for each age-group determined the significance of the differences between the mean scores for each age-group. However, information is still lacking on whether there are differences between each age-group's responses to individual items of the questionnaire.

Siegel (1956) stated that when frequencies are in discrete categories, the $\underline{X}^2$ test may be used "to determine the significance of the differences among $\underline{k}$ independent groups." For the PSES and VSES, the $\underline{X}^2$ formula used was that proposed by Edwards (1968) for two or more samples with two classes. The $\underline{X}^2$ formula for the SAS was that advocated by Edwards (1968) for two or more samples with more than two classes.

Examples of the contingency tables involved are provided in Tables 77 and 78.

TABLE 77. Observed Frequencies of Xhosa Subjects Giving Affirmative or Negative Answers to Item 7 of the PSES

	X1	X2	X3	X4	X5	
Neg. Ans.	14	14	12	16	16	72
Pos. Ans.	6	6	8	4	4	28
	20	20	20	20	20	100

TABLE 78. Observed Frequencies of White Subjects Giving Affirmative Answers to Item 2 on the SAS

	W1	W2	W3	W4	W5	
Dirty	13	10	1	2	0	26
Clean	7	10	15	12	15	59
Neither	0	0	4	6	5	15
	20	20	20	20	20	100

The number of subjects responding in the affirmative or negative to each item on the PSES, VSES and SAS appears in Tables 11 - 13 in Appendix Two.

A significant $\underline{X}^2$ for a particular item will indicate a significant difference between at least two of the groups. All calculations were made by electronic computer.

PSES

TABLE 79. X^2 Values for Xhosa and White Groups on Each Item of the PSES

Item	Whites	Xhosas
1	37.65*	2.78
2	3.92	21.05
3	11.33	14.65*
4	14.52*	16.08*
5	21.47*	40.23*
6	14.88*	30.56*
7	12.55	35.33*
8	11.93	44.18*
9	8.42	2.30
10	5.50	3.06

X^2 .01 = 13.28

* $p < .01$

It is interesting to note from Table 79 that a significant age difference was found for only four items for White subjects, as opposed to seven for the Xhosa subjects. For the White subjects no significant $\underline{X}^2$ was found for the last four items of the PSES. The $\underline{X}^2$ for Items 9 and 10 for the Xhosa groups are not significant. This means that no significant differences exist between the number of subjects in the five age-groups claiming to have experienced the most intense aversive encounters with snakes.

VSES

From Table 80 we see that only two significant $\underline{X}^2$ values were obtained for the White groups on the VSES. There are no significant differences between the number of subjects in the White groups claiming to have undergone the most intense aversive vicarious experiences of snakes (Items 6 - 10).

TABLE 80. X^2 Values for Xhosa and White Groups on Each Item of the VSES

Item	White	Xhosas
1	7.78	14.57*
2	7.73	20.22*
3	20.01*	8.13
4	4.46	9.70
5	16.67*	21.05*
6	2.64	18.67*
7	5.35	15.31*
8	9.23	7.11
9	6.25	4.61
10	4.04	0.71

X^2 .01 = 13.28

* $p < .01$

The picture is different for the Xhosa groups where the $\underline{X}^2$ for Items 1, 2, 5, 6 and 7 is significant. These findings are similar to those in Table 79 for Xhosa subjects. It is again interesting to note the lack of significant differences between the five age-groups for Items 8, 9 and 10, describing the most aversive vicarious experiences with snakes.

SAS

From Table 81 it will be noted that the responses of the Xhosa subjects to the items of the SAS show a remarkable consistency across the five age-groups. Significant differences between age-groups were found for only one item, i.e. Item 5 ("Do you believe that snakes : A. Have a pleasant smell; B. Stink; C. Neither").

TABLE 81. X^2 Values for Xhosa and White Groups on Each Item of the SAS

Item	Whites	Xhosas
1	37.31*	15.56
2	41.33*	7.14
3	25.43*	20.65
4	50.25*	11.96
5	54.41*	27.21*
6	21.41*	19.31
7	21.79*	8.06
8	28.62*	8.56
9	27.74*	7.91
10	39.74*	15.97

X^2 .01 = 20.69

*p $<$ .01

A completely different trend is apparent for the White subjects. A highly significant X^2 was found for each item. In a preceding section the dramatic drop in SAS means between W2 and the three older age-groups was discussed. From Table 81 we learn that this drop occurs for each of the items on the SAS and not for just a certain number of items.

Of the 20 subjects in W3, six of the boys reported having caught a snake at some stage in their lives, and four of the boys reported having

kept a snake as a pet. Only two boys in W2 reported having indulged in such activities, while none of the boys in W1 had done so. The interest in snakes evinced by subjects, particularly in W3, was completely lacking in the Xhosa subjects.

If formal education (e.g. biology) plays a role in determining attitudes towards snakes, then the vast discrepancy in the quality of education received by Xhosa and White boys would heavily favour the White boys receiving factual information about snakes in the school laboratory.

The possible relevance of visits to snake-parks and the availability of accurate literature on snakes has already been discussed. Generally, the balance appears to be heavily tipped in favour of the White subjects, rather than the Xhosa subjects, receiving the information necessary to dispel irrational attitudes towards snakes.

5.5. Summary of Results and Conclusions

The Influence of Age

The extent of the Xhosa subjects' personal aversive experiences of snakes, as measured by the PSES, increased consistently with an increase in age. For the White groups the mean PSES scores increased until the 18 - 20 year group. The mean for the over 25 year group was slightly lower than the mean for the 18 - 20 year group.

The mean Vicarious Snake Experience Scale (VSES) scores increased consistently across the Xhosa age groups until the over 25 year group which had the same mean score as the 18 - 20 year group. For the White groups there was a significant increase in VSES scores only between the 6 - 7 year group and the 9 - 11 year group.

Attitudes towards snakes, as measured by the SAS, showed distinctly different age trends for the White and Xhosa groups. There was a significant decrease in negative attitude scores for Whites between the age groups 9 - 11 years and 14 - 15 years. The SAS means for the three older White groups were significantly lower than the means for the two younger White groups. No consistent age trend in SAS means was found for the Xhosa groups. Negative attitude scores increased significantly between the 6 - 7 year group and the 9 - 11 year group. The mean SAS score for the 14 - 15 year group was significantly lower than the SAS mean for the 9 - 11 year group. Mean SAS scores increased again for the two older Xhosa groups.

The overt behavioural measure of the fear of snakes (BAT) reflected a very similar level of the fear of snakes for the two youngest White groups. The BAT mean for the 14 - 15 year group was significantly higher (less fear) than the mean for the 9 - 11 year group. The BAT means for the three oldest White groups remained relatively constant. These findings contradict those of Jones and Jones (1928) who reported that the

fear of snakes was more intense in a group of university students than in younger groups of subjects.

The BAT means for the Xhosa groups revealed a significant increase in the fear of snakes between the three youngest age groups and the 18 - 20 year group. The mean for the over 25 year group did not differ significantly from the means for the other four groups.

The GSR Test (GSRT) produced rather different results to the BAT. No significant differences were found between the GSRT means for the five White groups. As in the case of the BAT measure, the GSRT mean for the 18 - 20 year Xhosa group reflected a significantly more intense fear of snakes as compared with the younger age groups.

The Influence of Culture

The overall PSES mean for the Xhosa subjects was significantly higher than the overall PSES mean for the White subjects. In fact, four of the five Xhosa age groups had significantly higher PSES means than corresponding White age groups.

There was no significant difference between the overall VSES means for the Xhosa and White subjects. However, the VSES mean for the over 25 year Xhosa group was significantly higher than the mean for the corresponding White group.

Striking differences were found between Whites and Xhosas on the SAS. The overall mean for the Xhosa subjects was significantly higher (indicating more negative attitudes towards snakes) than the overall White mean. From the paired comparison of SAS means it was found that four of the five Xhosa groups had significantly higher SAS means than the corresponding White groups. The suggested explanation for these differences was in terms of Whites having greater opportunities of obtaining factual information about snakes, e.g. from snake-parks, literature, films and radio.

Significant differences between BAT means for Whites and Xhosas were found for only two of the five age groups. The mean for the 9 - 11 year Xhosa group was significantly higher (lower fear) than the corresponding White group, while the mean for the 18 - 20 year Xhosa group was significantly lower (higher fear) than the corresponding White group.

Several independent variables which may be of importance in the fear of snakes, e.g. socio-economic status and educational achievement, were not controlled for in the present experiment. The discrepancy between Whites and Xhosas on these variables was vast, particularly for the three older age groups. Therefore, the fact that only a few significant differences were found between corresponding White and Xhosa groups is all the more notable. The popularly held notion that Xhosas are considerably more frightened of snakes than are Whites is not supported by the findings of this study. Furthermore, the fact that subjects of the same age, from two widely different cultures, reacted in much the same way to a snake, suggests caution in an over-hasty dismissal of the theory of an innate fear of snakes.

Relationship between Measures Used in the Experiment

In three of the five White groups, subjects who showed high-fear (HF) on the BAT scored significantly lower on the PSES than low-fear (LF) subjects. This was also found for one of the Xhosa groups. Very similar findings were obtained for the PSES scores split according to whether the subject showed HF or LF on the GSRT. In no single instance was a PSES mean for HF subjects significantly higher than a PSES mean for LF subjects. These findings were completely unexpected in view of Rachman and Costello's (1961) theory of the learning of fear. On the basis of this theory we would have predicted that subjects who had undergone intense aversive experiences of snakes would have shown significantly higher

fear than subjects who had undergone less intense experiences.

No consistent significant relationship was found between the subjects' scores on the VSES and level of fear on the BAT and the GSRT. The significant differences between VSES means for HF and LF subjects were all in the direction of LF subjects having had significantly more intense vicarious aversive experiences with snakes than HF subjects. An opposite trend to that found in the present experiment was initially predicted on the basis of Bandura, Blanchard and Ritter's (1969) finding that the vast majority of snake phobic subjects reported intense vicarious aversive experiences of snakes.

The present study clearly showed that aversive experiences as measured by the PSES and VSES, were not related to HF on the BAT and the GSRT.

Wicker (1969) reviewed a large number of studies showing very low correlations between attitudes and overt behaviour. In the present study no consistent trend was found in the SAS means for HF and LF subjects. When the SAS scores were split according to the subjects' performance on the BAT, two of the Xhosa groups had significantly higher SAS means for LF subjects than for HF subjects. On the other hand, in three of the White groups, LF subjects scored significantly lower on the SAS than HF subjects. When the SAS scores were split according to the subjects' performance on the GSRT, significant differences between SAS means for HF and LF subjects were found for only one of the White groups. On the whole, negative attitudes towards snakes did not predispose subjects to show more intense fear of snakes than subjects with more positive attitudes.

Both the analysis of variance of the BAT means for subjects showing HF or LF on the GSRT, and the analysis of variance of the GSRT means for subjects showing HF or LF on the BAT, strongly suggested that there was

an extremely low correlation between these two measures. This was confirmed by the calculation of the Pearson Correlation Coefficient for the BAT and GSRT scores. The value for r was -0.14 which indicated a slight but significant correlation between the two measures of fear. This finding is in agreement with that of Agras (1967) and with Bernstein and Allen's (1969) contention that fear is not organized in a unitary way but consists of several components, self-report, behavioural and physiological, which are relatively independent of each other.

Comments on Measures Used and Future Research

The relationship between aversive experiences and the fear of snakes needs to be explored in greater detail. The VSES could certainly be expanded to include many more instances of vicarious aversive experiences. The PSES and VSES proved to be suitable scales for use on young subjects as well as adults. Few subjects were reluctant to discuss their experiences with snakes and this type of information was easily elicited.

The SAS showed that a large proportion of the subjects had highly irrational attitudes towards snakes. Additional information on subjects' knowledge of snakes could prove of great importance. The Experimenter gained the impression that the greater the subject's ignorance of snakes the more irrational his fear.

A behavioural measure of fear is clearly the most relevant to a study of the kind described in this dissertation. As Bolles (1968) stated, "we know whether our Ss are frightened by how they respond, and not by what is going on in their autonomic nervous systems."

A number of independent variables, which have been neglected up to the present, certainly warrant investigation. For example, the fear of snakes could well be related to personality variables such as introversion-extraversion and emotionality or neuroticism.

APPENDIX ONE

TABLE 1. Raw Scores for Xhosa Subjects 6 - 7 years (X1).

S	PSES	VSES	SAS	BAT	GSRT
1	4	0	14	18	0.00
2	7	0	18	14	54.50
3	1	0	12	3	37.76
4	4	0	16	15	76.59
5	1	0	14	20	55.60
6	1	9	14	13	12.87
7	0	6	18	15	2.91
8	0	9	6	2	17.27
9	7	10	16	20	0.00
10	0	4	20	20	0.00
11	9	9	14	14	135.60
12	0	0	14	9	0.00
13	6	0	20	8	95.50
14	6	0	16	14	26.30
15	5	7	20	4	209.99
16	7	6	20	20	0.00
17	7	6	14	20	0.00
18	7	6	10	8	142.80
19	0	6	16	3	121.82
20	7	6	14	17	40.01

TABLE 2. Raw Scores for Xhosa Subjects 9 - 11 years (X2).

S	PSES	VSES	SAS	BAT	GSRT
21	9	9	16	9	7.76
22	9	10	16	16	107.07
23	0	4	20	13	42.84
24	3	6	20	15	17.80
25	4	6	20	14	34.74
26	0	6	20	18	81.21
27	9	8	18	15	0.00
28	7	4	20	7	15.12
29	0	6	14	15	86.93
30	8	4	20	15	0.00
31	1	1	14	17	11.86
32	0	6	20	3	76.31
33	9	8	16	20	14.27
34	6	6	20	14	14.27
35	0	4	20	20	18.79
36	0	6	20	15	46.19
37	7	4	14	18	49.94
38	0	6	18	5	100.12
39	8	9	18	20	66.64
40	3	1	20	20	0.00

TABLE 3. Raw Scores for Xhosa Subjects 14 - 15 years (X3).

S	PSES	VSES	SAS	BAT	GSRT
41	8	4	16	15	13.33
42	2	0	18	20	33.40
43	6	6	11	15	*
44	1	6	16	11	100.00
45	5	6	17	20	5.58
46	8	6	8	15	99.85
47	6	6	19	3	56.24
48	0	6	16	15	11.10
49	8	6	16	14	155.00
50	8	4	16	13	171.34
51	1	10	18	11	0.00
52	8	6	15	6	0.00
53	7	4	18	20	85.60
54	8	4	16	14	60.67
55	9	10	19	15	78.53
56	8	6	20	20	0.00
57	8	9	12	20	0.00
58	9	9	13	9	0.00
59	9	8	16	16	200.12
60	8	4	8	14	41.71

* Subject requested termination of test before the completion of the first five steps.

TABLE 4. Raw Scores for Xhosa Subjects 18 - 20 years (X4).

S	PSES	VSES	SAS	BAT	GSRT
61	8	9	20	6	222.20
62	8	7	18	20	0.00
63	8	7	19	15	0.00
64	7	6	15	9	30.00
65	8	9	17	9	0.00
66	9	9	17	8	41.67
67	7	9	15	6	190.00
68	8	9	18	5	0.00
69	8	8	17	9	68.00
70	8	6	18	8	56.67
71	8	6	20	13	175.00
72	8	9	20	18	391.67
73	7	6	15	8	0.00
74	10	10	18	1	*
75	8	6	18	8	10.20
76	7	8	20	8	91.12
77	8	8	14	8	75.01
78	8	8	15	8	132.02
79	8	6	14	4	40.00
80	8	6	20	18	0.00

* Subject requested termination of test before the completion of the first five steps.

TABLE 5. Raw Scores for Xhosa Subjects over 25 years (X5).

S	PSES	VSES	SAS	BAT	GSRT
81	10	6	16	14	108.33
82	8	6	15	13	126.64
83	9	9	12	5	57.14
84	8	7	20	9	29.99
85	9	8	19	6	47.54
86	8	7	20	5	*
87	9	9	20	9	0.00
88	9	9	12	14	58.07
89	8	9	17	15	12.52
90	8	9	11	4	18.10
91	8	7	15	* *	0.00
92	9	6	18	12	49.97
93	9	6	16	15	49.96
94	8	6	17	15	78.13
95	9	8	16	4	0.00
96	8	9	17	15	0.00
97	8	9	14	20	0.00
98	8	6	17	20	66.64
99	8	6	18	14	114.69
100	8	10	12	15	0.00

* Subject requested termination of test before the completion of the first five steps.

* * Subject refused to undergo test.

TABLE 6. Raw Scores for White Subjects 6 - 7 years (W1).

S	PSES	VSES	SAS	BAT	GSRT
101	2	5	20	16	75.07
102	6	4	18	14	90.36
103	1	6	20	8	0.00
104	2	4	17	4	19.25
105	2	7	12	9	49.93
106	3	7	9	14	110.42
107	2	3	16	10	38.50
108	7	5	17	7	38.47
109	1	3	20	5	162.97
110	1	6	18	14	49.87
111	2	4	12	15	114.20
112	3	6	4	20	28.01
113	2	6	12	15	67.45
114	4	0	16	8	33.38
115	2	7	0	20	34.74
116	2	4	20	11	4.34
117	2	6	8	15	87.98
118	0	6	14	7	50.00
119	4	7	16	10	0.00
120	0	5	18	2	30.38

TABLE 7. Raw Scores for White Subjects 9 - 11 years (W2).

S	PSES	VSES	SAS	BAT	GSRT
121	5	6	16	5	10.01
122	5	7	12	11	169.20
123	5	6	6	5	36.38
124	6	6	12	17	216.68
125	4	6	20	12	90.84
126	5	8	18	15	20.00
127	5	6	14	14	11.54
128	6	4	14	20	63.58
129	3	4	14	3	*
130	4	7	15	4	*
131	6	10	15	18	0.00
132	5	5	16	15	11.77
133	0	5	11	15	3.85
134	2	6	20	2	*
135	5	5	13	16	78.03
136	6	6	20	15	21.45
137	6	8	16	15	90.12
138	5	7	20	11	40.00
139	3	6	4	10	66.64
140	4	6	18	3	212.43

* Subject requested termination of test before the completion of first five steps.

TABLE 8. Raw Scores for White Subjects 14 - 15 years (W3).

S	PSES	VSES	SAS	BAT	GSRT
141	6	7	10	10	185.60
142	8	9	6	20	0.00
143	2	5	10	11	30.55
144	6	9	11	20	189.75
145	3	7	11	18	54.32
146	2	5	5	16	0.00
147	6	7	9	20	4.71
148	6	5	8	20	0.00
149	8	9	7	20	0.00
150	3	3	16	15	100.00
151	3	4	6	14	14.27
152	1	7	7	9	94.40
153	2	7	3	20	0.00
154	6	6	8	16	0.00
155	3	5	9	18	18.17
156	5	4	8	20	0.00
157	6	4	6	14	25.00
158	7	7	6	18	0.00
159	7	8	9	15	0.00
160	4	0	10	10	191.45

TABLE 9. Raw Scores for White Subjects 18 - 20 years (W4).

S	PSES	VSES	SAS	BAT	GSRT
161	6	9	11	18	0.00
162	10	7	9	18	36.33
163	0	5	19	8	0.00
164	8	9	12	17	0.00
165	6	8	13	20	133.30
166	8	7	6	20	44.40
167	9	5	9	14	15.40
168	6	7	10	13	0.00
169	8	8	10	15	97.12
170	3	6	10	12	12.50
171	6	8	11	17	22.50
172	1	5	16	9	64.67
173	5	8	10	14	92.14
174	1	4	12	8	27.53
175	6	8	15	18	166.67
176	7	9	6	18	52.36
177	3	6	7	17	64.43
178	5	5	8	15	0.00
179	2	6	6	14	107.39
180	10	8	3	20	18.74

TABLE 10. Raw Scores for White Subjects over 25 years (W5).

S	PSES	VSES	SAS	BAT	GSRT
181	8	7	7	20	0.00
182	2	4	5	11	118.18
183	2	6	13	8	83.03
184	2	5	5	15	85.17
185	8	7	5	20	27.49
186	6	8	8	18	39.23
187	7	7	18	2	56.25
188	1	5	12	13	66.67
189	4	0	4	15	41.90
190	6	6	7	13	30.77
191	2	6	6	18	86.19
192	4	4	8	18	26.79
193	6	6	8	16	35.30
194	9	7	10	20	0.00
195	9	9	3	20	50.14
196	6	7	12	8	5.56
197	3	7	6	15	11.23
198	4	7	14	3	12.50
199	10	5	2	16	193.33
200	8	9	4	20	0.00

APPENDIX TWO

TABLE 11. No. of Subjects Giving Affirmative Answers to Each Item of the PSES.

Item	X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
1	6	6	8	4	4	8	11	20	19	20
2	12	12	17	20	20	15	18	17	16	19
3	7	7	10	17	13	5	14	13	13	13
4	11	9	13	19	17	4	14	12	13	14
5	5	4	11	19	18	1	13	9	14	11
6	5	9	13	19	18	2	5	9	12	11
7	6	7	7	17	20	1	0	2	6	6
8	1	4	12	16	18	0	0	2	5	5
9	1	4	3	2	8	0	0	0	2	3
10	0	0	0	1	1	0	0	0	2	1

TABLE 12. No. of Subjects Giving Affirmative Answers to Each Item of the VSES.

Item	X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
1	6	10	6	15	14	16	18	16	11	16
2	3	4	4	14	10	16	12	11	8	14
3	5	6	2	9	9	16	15	10	4	14
4	7	12	14	15	15	13	18	15	16	17
5	0	0	0	5	0	7	14	12	19	14
6	11	13	12	19	20	10	13	8	10	11
7	2	2	1	9	7	4	6	9	10	9
8	3	4	4	9	3	0	3	3	7	3
9	4	3	3	7	7	0	0	3	3	2
10	1	1	2	1	1	0	1	0	0	0

TABLE 13. No. of Subjects Giving Affirmative Answers to Each Item of the SAS.

Item		X1	X2	X3	X4	X5	W1	W2	W3	W4	W5
1	A	2	1	5	0	0	6	4	11	3	5
	B	18	19	15	20	19	13	13	0	9	3
	C	0	0	0	0	1	1	3	9	8	12
2	A	16	19	16	18	15	13	10	1	2	0
	B	4	1	3	1	3	7	10	15	12	15
	C	0	0	1	1	2	0	0	4	6	5
3	A	5	5	10	10	10	6	5	10	5	12
	B	15	15	6	7	6	13	15	4	12	5
	C	0	0	4	3	4	1	0	6	3	3
4	A	17	20	16	19	18	16	13	4	3	3
	B	3	0	2	0	0	4	5	4	1	1
	C	0	0	1	1	2	0	2	12	16	16
5	A	4	0	2	1	1	2	2	0	0	0
	B	16	20	17	16	11	15	12	2	1	1
	C	0	0	1	3	8	3	6	18	19	19
6	A	12	19	17	19	18	10	12	6	4	3
	B	8	1	2	1	1	10	8	11	15	12
	C	0	0	1	0	1	0	0	3	1	5
7	A	1	0	0	0	0	4	1	6	4	9
	B	19	20	19	20	20	16	19	11	12	11
	C	0	0	1	0	0	0	0	3	4	0
8	A	17	20	20	19	19	14	17	8	12	13
	B	3	0	0	1	1	6	2	3	0	0
	C	0	0	0	0	0	0	1	9	8	7
9	A	9	6	7	6	11	3	3	7	9	15
	B	11	14	13	14	9	17	17	12	9	5
	C	0	0	0	0	0	0	0	1	2	0
10	A	11	17	10	17	17	12	14	1	3	2
	B	9	3	10	3	3	8	6	17	13	17
	C	0	0	0	0	0	0	0	2	4	1

APPENDIX THREE

Analysis of Variance of the Complete Data

In Tables 14 - 18 :

a1 = Xhosa Subjects.

A2 = White Subjects.

b1 - b5 = Age Groups 1 - 5.

TABLE 14. ABS Summary Table of PSES Scores

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
4	9	8	8	10	2	5	6	6	8
7	9	2	8	8	6	5	8	10	2
1	0	6	8	9	1	5	2	0	2
4	3	1	7	8	2	6	6	8	2
1	4	5	8	9	2	4	3	6	8
1	0	8	9	8	3	5	2	8	6
0	9	6	7	9	2	5	6	9	7
0	7	0	8	9	7	6	6	6	1
7	0	8	8	8	1	3	8	8	4
0	8	8	8	8	1	4	3	3	6
9	1	1	8	8	2	6	3	6	2
0	0	8	8	9	3	5	1	1	4
6	9	7	7	9	2	0	2	5	6
6	6	8	10	8	4	2	6	1	9
5	0	9	8	9	2	5	3	6	9
7	0	8	7	8	2	6	5	7	6
7	7	8	8	8	2	6	6	3	3
7	0	9	8	8	0	5	7	5	4
0	8	9	8	8	4	3	7	4	10
7	3	8	8	8	0	4	4	10	8

TABLE 15. ABS Summary Table of VSES Scores

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
0	9	4	9	6	5	6	7	9	7
0	10	0	7	6	4	7	9	7	4
0	4	6	7	9	6	6	5	5	6
0	6	6	6	7	4	6	9	9	5
0	6	6	9	8	7	6	7	8	7
9	6	6	9	7	7	8	5	7	8
6	8	6	9	9	3	6	7	5	7
9	4	6	9	9	5	4	5	7	5
10	6	6	8	9	3	4	9	8	0
4	4	4	6	9	6	7	3	6	6
9	1	10	6	7	4	10	4	8	6
0	6	6	9	6	6	5	7	5	4
0	8	4	6	6	6	5	7	8	6
0	6	4	10	6	0	6	6	4	7
7	4	10	6	8	7	5	5	8	9
6	6	6	8	9	4	6	4	9	7
6	4	9	8	9	6	8	4	6	7
6	6	9	8	6	6	7	7	5	5
6	9	8	6	6	7	6	8	6	6
6	1	4	6	10	5	6	0	8	9

TABLE 16. ABS Summary of SAS Scores

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
14	16	16	20	16	20	16	10	11	7
18	16	18	18	15	18	12	6	9	5
12	20	11	19	12	20	6	10	19	13
16	20	16	15	20	17	12	11	12	5
14	20	17	17	19	12	20	11	13	5
14	20	8	17	20	9	18	5	6	8
18	18	19	15	20	16	14	9	9	18
6	20	16	18	12	17	14	8	10	12
16	14	16	17	17	20	14	7	10	4
20	20	16	18	11	18	15	16	10	7
14	14	18	20	15	12	15	6	11	6
14	20	15	20	18	4	16	7	16	8
20	16	18	15	16	12	11	3	10	8
16	20	16	18	17	16	20	8	12	10
20	20	19	18	16	0	13	9	15	3
20	20	20	20	17	20	20	8	6	12
14	14	12	14	14	8	16	6	7	6
10	18	13	15	17	14	20	6	8	14
16	18	16	14	18	18	4	9	6	2
14	20	8	20	12	16	18	10	3	4

TABLE 17. ABS Summary Table of BAT Scores

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
18	9	15	6	14	16	5	10	18	20
14	16	20	20	13	14	11	20	18	11
3	13	15	15	5	8	5	11	8	8
15	15	11	9	9	4	17	20	17	15
20	14	20	9	6	9	12	18	20	20
13	18	15	8	5	14	15	16	20	18
15	15	3	6	9	10	14	20	14	2
2	7	15	5	14	7	20	20	13	13
20	15	14	9	15	5	3	20	15	15
20	15	13	8	4	14	4	15	12	13
14	17	11	13	*	15	18	14	17	18
9	3	6	18	12	20	15	9	9	18
8	20	20	8	15	15	15	20	14	16
14	14	14	1	15	8	2	16	8	20
4	20	15	8	4	20	16	18	18	20
20	15	20	8	15	11	15	20	18	8
20	18	20	8	20	15	15	14	17	15
8	5	9	4	20	7	11	18	15	3
3	20	16	11	14	10	10	15	14	16
17	20	14	18	15	2	3	10	20	20

* Subject refused to undergo test.

TABLE 18. ABS Summary Table for GSRT Scores

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
0.00	7.76	13.33	22.20	108.33	75.07	10.01	185.60	0.00	0.00
54.50	107.07	33.40	0.00	126.64	90.36	169.20	0.00	36.33	118.18
37.76	42.84	*	0.00	57.14	0.00	36.38	30.55	0.00	83.03
76.59	77.80	100.00	30.00	29.99	19.25	216.68	189.75	0.00	85.17
55.60	34.74	5.58	0.00	47.54	49.93	90.84	54.32	133.30	27.49
12.87	81.21	99.85	41.67	*	110.42	20.00	0.00	44.40	39.23
2.91	0.00	56.24	190.00	0.00	38.50	11.54	4.71	15.40	56.25
17.27	15.12	11.00	0.00	58.07	38.47	63.58	0.00	0.00	66.67
0.00	86.93	155.00	68.00	12.52	162.97	*	0.00	97.12	41.90
0.00	0.00	171.34	56.67	18.10	49.87	*	100.00	12.50	30.77
135.60	11.86	0.00	175.00	0.00	114.20	0.00	14.27	22.50	86.19
0.00	76.31	0.00	391.67	49.97	28.01	11.77	94.40	64.67	26.79
95.50	14.27	85.60	0.00	49.96	67.45	3.85	0.00	92.14	35.30
26.30	14.27	60.67	*	78.13	33.38	*	0.00	27.53	0.00
209.99	18.79	78.53	10.20	0.00	34.74	78.03	18.17	166.67	50.14
0.00	46.19	0.00	91.12	0.00	4.34	21.45	0.00	52.36	5.56
0.00	49.94	0.00	75.01	0.00	87.98	90.12	25.50	64.43	11.23
142.80	100.12	0.00	132.01	66.64	50.00	40.00	0.00	0.00	12.50
121.82	66.64	200.12	40.00	114.29	0.00	66.64	0.00	107.39	193.33
40.01	0.00	41.71	0.00	0.00	30.38	212.43	191.45	18.74	0.00

* Subject would not permit the completion of the first five steps of the test.

Analysis of Variance of Data Split According to Subjects' Performance on the GSRT

In Tables 19 - 26 :

a1 = Subjects Showing High-Fear on the GSRT.

a2 = Subjects Showing Low-Fear on the GSRT.

b1 - b5 = Age Groups 1 - 5.

TABLE 19. ABS Summary Table of PSES Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
7	9	2	8	10	4	9	8	8	8
1	0	1	9	9	1	9	6	8	8
4	3	8	7	9	0	7	5	7	9
1	4	6	8	8	0	8	0	8	8
9	0	8	8	9	7	1	1	8	8
6	0	8	8	9	0	9	8	7	8
5	0	7	8	9	0	6	8	10	8
7	0	8	7	8	6	0	8	8	9
0	7	9	8	8	7	3	9	8	8
7	0	9	8	8	7				8
	8	8	8						

TABLE 20. ABS Summary Table of PSES Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
2	5	6	10	2	1	5	8	6	8
6	5	2	6	2	2	5	2	0	8
2	6	6	8	2	2	5	6	8	4
3	4	3	8	6	3	6	6	9	9
2	6	3	1	7	2	5	8	6	6
7	3	1	5	1	0	0	3	3	3
1	4	4	6	4		5	2	6	4
1	2		7	6		6	6	1	8
2	6		3	2		5	3	5	
2			2	6		3	5	10	
4				9		4	6		
2				10			7		
2							7		
0									

TABLE 21. ABS Summary Table of VSES Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a5 b5
0	10	0	9	6	0	9	4	7	6
0	4	6	9	9	9	8	6	7	7
0	6	6	9	8	6	4	6	6	9
0	6	6	8	7	9	4	6	9	9
9	6	6	6	9	10	1	10	9	9
0	6	4	6	6	4	8	6	6	7
7	6	4	9	6	0	6	6	10	8
6	6	4	8	6	0	4	9	6	9
6	4	10	8	6	6	1	9	6	10
6	6	8	8	6	6				9
	9	4	6						

TABLE 22. ABS Summary Table of VSES Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
5	7	7	7	4	6	6	9	9	7
4	6	5	8	6	4	8	5	5	7
7	6	9	7	5	6	6	7	9	4
7	6	7	8	8	4	10	5	5	7
3	4	3	5	7	7	5	9	7	7
5	4	7	8	5	5	5	4	6	7
3	7	0	8	0		5	7	8	5
6	6		9	6		8	6	4	9
4	6		6	6		7	5	5	
6			6	6		6	4	8	
0				9		6	4		
7				6			7		
6							8		
6									

TABLE 23. Summary Table of SAS Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
18	16	18	20	16	14	16	16	18	15
12	20	16	17	12	14	18	11	19	20
16	20	8	15	19	18	20	17	15	20
14	20	19	17	20	6	20	16	17	17
14	20	16	18	12	16	14	18	18	11
20	14	16	20	18	20	16	15	15	15
20	20	18	20	16	14	20	20	18	16
10	20	16	20	17	16	20	12	18	17
16	14	19	14	17	20	20	13	20	14
14	18	16	15	18	14				12
	18	8	14						

TABLE 24. ABS Summary Table of SAS Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
20	12	10	9	5	20	16	6	11	7
18	6	10	13	13	17	18	5	19	5
12	12	11	6	5	4	14	9	12	8
9	20	11	10	8	20	15	8	9	10
16	14	16	16	18	18	16	7	10	12
17	14	7	10	12	16	11	6	10	6
20	15	10	15	4		13	3	11	14
18	20		6	7		16	8	12	4
12	20		7	6		20	9	8	
12			6	8		4	8	3	
16				3		18	6		
0				2			6		
8							9		
14									

TABLE 25. Summary Table of BAT Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
14	16	20	6	14	18	9	15	20	13
3	13	11	8	5	13	15	15	15	9
15	15	15	6	6	15	7	20	9	9
20	14	3	9	5	2	15	15	9	15
14	18	14	8	14	20	17	11	5	4
8	15	13	13	12	20	20	6	8	20
4	3	20	18	15	9	14	20	1	4
8	15	14	8	15	14	20	20	8	15
3	18	15	8	20	20	20	9	18	20
17	5	16	4	14	20				15
	20	14	11						

TABLE 26. ABS Summary Table of BAT Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
16	11	10	18	11	8	5	20	18	20
14	5	11	20	8	4	15	16	8	20
9	17	20	20	15	20	14	20	17	18
14	12	18	15	18	11	18	20	14	20
10	20	15	9	2	10	15	20	13	8
7	3	9	14	13	2	15	14	12	15
5	4	10	18	15		16	20	17	3
14	2		18	13		15	16	8	20
15	15		17	18		11	18	15	
15			14	16		10	20	20	
8				20		3	14		
20				16			18		
15							15		
7									

Analysis of Variance of Data Split According to Subjects' Performance on the BAT

In Tables 27 - 34 :

a1 = Subjects Showing High-Fear on the BAT.

a2 = Subjects Showing Low-Fear on the BAT.

b1 - b5 = Age Groups 1 - 5.

TABLE 27. ABS Summary Table of PSES Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
1	9	1	8	8	4	9	8	8	10
1	0	6	7	9	7	3	2	8	9
0	7	8	8	8	4	4	6	8	8
0	0	1	9	9	1	0	5	8	9
6	0	8	7	8	0	9	8		8
5		9	8	9	7	0	0		8
7			8	8	0	8	8		8
0			8	8	9	1	7		8
			8	9	6	9	8		8
			7	9	7	6	9		8
			10		7	0	8		
			8		7	0	8		
			7			7	9		
			8			8	8		
			8			3			
			8						

TABLE 28. ABS Summary Table of PSES Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
1	5	6	0	2	2	6	8	6	8
2	5	2	6	2	6	5	6	10	2
2	5	1	3	7	3	5	3	8	8
2	4	4	1	1	1	6	2	6	6
7	3		1	6	2	6	6	8	4
1	4			6	3	5	6	9	2
4	2			4	2	0	8	8	4
2	5				2	5	3	6	6
0	3				2	6	3	5	9
4	4					6	2	6	9
0							6	7	3
							3	3	10
							5	5	8
							6	2	
							7	10	
							7		

TABLE 29. ABS Summary Table of VSES Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
0	9	6	9	6	0	10	4	7	6
9	4	6	6	9	0	6	0	7	9
9	4	4	9	7	0	6	6	9	9
0	6	10	9	8	0	6	6	6	6
0	6	6	9	7	6	8	6		6
7		9	9	9	10	6	6		9
6			8	9	4	4	6		9
6			6	7	9	1	4		6
			6	6	0	8	4		6
			6	8	6	6	10		10
			10		6	4	6		
			6		6	6	9		
			8			4	8		
			8			9	4		
			8			1			
			6						

TABLE 30. ABS Summary Table of VSES Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
6	6	7	5	4	5	6	9	9	7
4	7	5	7	6	4	8	9	7	5
7	6	7	6	7	7	6	7	9	7
3	6	0	5	5	6	4	5	8	8
5	4		4	6	4	10	7	7	0
3	7			7	6	5	5	5	6
0	6			5	6	5	9	8	4
4	7				7	5	3	8	6
6	6				6	6	4	8	7
7	6					8	7	8	9
5							6	9	7
							5	6	6
							4	5	9
							4	6	
							7	8	
							8		

TABLE 31. ABS Summary Table of SAS Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
12	16	16	20	15	14	16	16	18	16
14	20	19	15	12	18	20	18	19	12
6	20	16	17	20	16	20	11	20	17
14	20	18	17	19	14	20	17	20	16
20	18	15	15	20	18	18	8		17
20		13	18	20	16	14	16		17
10			17	11	20	20	16		14
16			18	15	14	14	18		17
			20	18	16	16	16		18
			15	16	20	20	19		12
			18		14	20	20		
			18		14	20	12		
			20			14	16		
			14			18	8		
			15			20			
			14						

TABLE 32. ABS Summary Table of SAS Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
20	16	10	19	5	20	12	6	11	7
17	12	10	10	13	18	18	11	9	5
12	6	7	10	18	9	14	11	12	5
16	20	10	16	12	18	14	5	13	8
17	14		12	7	12	15	9	6	4
20	15			12	4	16	8	9	6
16	20			14	12	11	7	10	8
20	20				0	13	16	11	8
14	4				8	20	6	10	10
18	18					16	3	15	3
16							8	6	6
							9	7	2
							8	8	4
							6	6	
							6	3	
							9		

TABLE 33. ABS Summary Table of GSRT Scores for HF and LF Xhosa Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
37.76	7.76	100.00	222.20	126.64	0.00	107.07	13.33	0.00	108.33
12.87	42.84	56.24	30.00	57.14	54.50	77.80	33.40	0.00	58.07
17.27	15.12	171.34	0.00	29.99	76.59	34.74	0.00	391.67	12.52
0.00	76.31	0.00	41.67	47.54	55.60	81.21	5.58	0.00	49.97
95.50	100.12	0.00	190.00	0.00	2.91	0.00	99.85		78.13
209.99		0.00	0.00	0.00	0.00	86.93	11.10		0.00
142.80		49.97	68.00	18.10	0.00	0.00	155.00		0.00
121.82		0.00	56.67		135.60	11.86	85.60		66.64
			175.00		26.30	14.27	60.67		114.29
			0.00		0.00	14.27	78.53		0.00
			0.00		0.00	18.79	0.00		0.00
			10.20		40.01	46.19	0.00		
			91.12		49.94	200.12			
			75.01		66.64	41.71			
			132.02		0.00				
			40.00						

TABLE 34. ABS Summary Table of GSRT Scores for HF and LF White Ss.

a1 b1	a1 b2	a1 b3	a1 b4	a1 b5	a2 b1	a2 b2	a2 b3	a2 b4	a2 b5
0.00	10.01	185.60	0.00	118.18	75.07	216.68	0.00	0.00	0.00
19.25	169.20	30.55	0.00	83.03	90.36	20.00	189.75	36.33	85.17
49.93	36.38	94.40	12.50	56.25	110.42	11.54	54.32	0.00	27.49
38.50	90.84	191.45	64.67	66.67	49.87	63.58	0.00	133.30	39.23
38.50	0.00		27.53	30.77	114.20	0.00	4.71	44.40	41.90
162.97	0.00			5.56	28.01	11.77	0.00	15.40	86.19
33.38	0.00			12.50	67.45	3.85	0.00	97.12	26.79
4.34	40.00				34.74	78.03	100.00	22.50	35.30
50.00	66.64				87.98	21.45	14.27	92.14	0.00
0.00	212.43					90.12	0.00	166.67	50.14
30.38							0.00	52.36	11.23
							18.17	64.43	193.33
							0.00	0.00	0.00
							25.00	107.39	
							0.00	18.74	
							0.00		

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