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CANADIAN THESES ON MICROFICHE — THÈSES CANADIENNES SUR MICROFICHE

NAME OF AUTHOR / NOM DE L'AUTEUR

TITLE OF THESIS / TITRE DE LA THÈSE

UNIVERSITY / UNIVERSITÉ

DEGREE FOR WHICH THESIS WAS PRESENTED / GRADE POUR LEQUEL CETTE THÈSE FUT PRÉSENTÉE — MASTER OF EDUCATION

YEAR THIS DEGREE CONFERRED / ANNÉE D'OBTENTION DE CE GRADE — 1976

NAME OF SUPERVISOR / NOM DU DIRECTEUR DE THÈSE — DR. J. KELLY

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THE UNIVERSITY OF ALBERTA

THE RELATIONSHIP BETWEEN ANXIETY AND TEST PERFORMANCE

BY

CEDRIC P. GRANNUM

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES AND RESEARCH

IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE

MASTER OF EDUCATION

DEPARTMENT OF EDUCATIONAL PSYCHOLOGY

EDMONTON, ALBERTA

SPRING, 1976

UNIVERSITY OF ALBERTA

FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis entitled "The Relationship Between Anxiety and Test Performance" submitted by Cedric F. Grannum in partial fulfilment of the requirements for the degree of Master of Education.

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ABSTRACT

This study was designed to investigate the relationship between anxiety and test-performance in the Guyana All-age schools.

A sample of 397 seventh-grade students (199 boys and 198 girls) was randomly drawn from two urban and two rural schools situated in predominantly middle and lower-class areas. One-half of the sample was randomly chosen to do a Mathematics Test under anxiety-allaying conditions. The other half wrote the same test under anxiety-arousing conditions. The groups were then sub-divided on the basis of their scores on the Test Anxiety Scale for Children (Sarason et al, 1960) which was administered prior to the achievement test. This sub-division yielded three groups: the low-test-anxious (bottom 20 percent), moderate-test-anxious (middle 60 percent) and the high-test-anxious (top 20 percent).

In order to reduce the disparity among the cell frequencies and thus minimize the statistical problems associated with the use of such unequal cell frequencies, 80 students were randomly chosen from the relatively large moderate-anxious group. This resulted in an equal number of observations (80) in each of the anxiety groups.

Analysis of the data revealed a significant negative correlation between the two variables (test-anxiety and test-

performance). (Pearson "r" = -.27, t = -4.39, df = 238, $p < .01$). A three way analysis of variance revealed significant differences in performance between the low- and the moderate-test-anxious groups ($F = 7.07$, df = 2,228, $p < .01$), and between the low- and the high-test-anxious groups ($F = 14.63$, df = 2,228, $p < .01$). Predicted difference due to sex and treatment did not reach the statistical significance required.

These findings supported the major hypothesis which predicted an inverse relationship between test-anxiety and test-performance.

The implications of these findings for educational administrators, and suggestions for future research were also discussed.

ACKNOWLEDGEMENTS

The author gratefully acknowledges the contribution of those individuals who assisted in this study.

Sincere appreciation is expressed to my supervisor Dr. V. Nyberg for the guidance and encouragement he so willingly gave, and to the other members of my committee, Professors R. MacArthur and L. Stewart, for their kind assistance.

I am especially indebted to Mr. Neville Watson for his invaluable assistance during the data-collecting stage, to Dr. L. Stewin for his guidance and support during the final stages of the project and to Messrs David Blackmore and Colin Park for their helpful suggestions.

Finally, deep appreciation is expressed to my wife, Mary, for the many hours she spent typing the manuscript, and for the moral support she gave throughout the entire exercise.

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CHAPTER I

Introduction

"Anxiety seems to be the dominant fact and is threatening to become the dominant climate of modern life." (Time, 1961, p. 41). This comment, made more than a decade ago, sums up quite succinctly the prevailing concern in contemporary society over the effects of this phenomenon. Anxiety is evident at all strata of society and seems to be a malady from which even the young have not escaped unscathed, for as Doyal and Friedman (1974) opine, few impairments cause children more difficulty.

There are those (e.g. Doll & Fleming, 1966) who trace the sharp increase in anxiety in our educational institutions to the launching of Sputnik I in 1957 and to the adverse criticisms of the quality of instruction in Western Europe and North America that followed in its wake. They argue that a reaction to the criticisms, has been a sharp increase in the quantity, though not necessarily the quality of instruction in the schools, and the inevitable result has been a tremendous pressure on the student population.

In Guyana this problem is compounded by a situation in which the demand for admission to schools at the post-elementary level far exceeds the number of places available. Consequently, the competition for the relatively few places is very keen, and in the process, the students are subjected

to intense pressure from both teachers and parents.

Another characteristic of our times and one that is related to anxiety, is the reliance on tests by present-day educators. National examinations in Guyana are a central part of the educational system and consequently the life of nearly every member of the population is affected by testing. As a student was overheard to remark, "Marks count for everything today. They count for college, they count for class-rank and they count towards your own feeling of well-being. (Doll, 1966, p. 8)

The current awareness of the importance of anxiety as a powerful influence on children's test performance is reflected in the proliferation of studies related to this phenomenon that have been undertaken within the past three decades. Spielberger (1966) estimated that over 3500 articles and books related to anxiety were published during the sixteen years preceding 1966.

In succeeding chapters evidence will be presented which indicates the existence of an inverse relationship between anxiety and test-performance; but in Guyana relatively little attention has been given to the serious implications of such a relationship.

Statement of the Problem

The literature is replete with studies in this area, but with a few exceptions (Sinha, 1972, Martinez &

Spielberger, (1973), most of these have been conducted on the North American and European Continents. However, the findings of studies done recently (Paschal & Kuo, 1973; Lian-Hwang-Chiu, 1971; Lynn, 1959; Bronzaft et al, 1974) suggest, that anxiety might be susceptible to certain cultural influences not indicated by North American research.

The purpose of the present research therefore is to determine the relationship between test-anxiety and test-performance in the Guyanese society with specific reference to the All-age school population.

It is envisaged that the findings will provide empirical evidence that would serve to facilitate decision-making in the Nation's Test Development Unit.

CHAPTER II

Review of the Literature

The Concept of Anxiety

Anxiety, according to Fischer (1970), is one of the central concepts in most of the theories of behaviour and personality. What is perhaps equally evident is that despite the consensus of opinion regarding the significance of this phenomenon, there seems to be little agreement among the theorists as to its nature. Consequently, theories and formulations differ according to the underlying assumptions espoused by the various theorists.

Psychoanalytic Approach. Those who belong to the Psychoanalytic school of thought, particularly those who share the orthodox Freudian view-point, tend in general to support the theoretical position enunciated by Freud. Freud (1963) recognized the problem of anxiety very early in his investigations and considered it

> ... a nodal point at which the most various and important questions converge, a riddle whose solution would be bound to throw a flood of light upon our whole mental existence. (p. 393)

In his early theoretical formulations he had postulated that anxiety is a consequence and direct manifestation of repressed libido (Freud, 1963). He later found it necessary to modify this view and defined anxiety as

> ... a direct and automatic reaction to a trauma and ... a signal of the danger of the approach of such a trauma. (Freud, 1936, p. xiii)

Freud distinguished between objective anxiety and neurotic anxiety. Objective anxiety, he contended, is synonymous with fear and represents an internal reaction to some external danger which is consciously perceived as a threat. Neurotic anxiety, according to Freudian theory, shares with objective anxiety the feelings of apprehension and physiological arousal but differs from that form of anxiety in that the source of the danger is internal and is not consciously perceived.

The relationship between the two forms is seen in Figure 1 taken from Spielberger (1966).

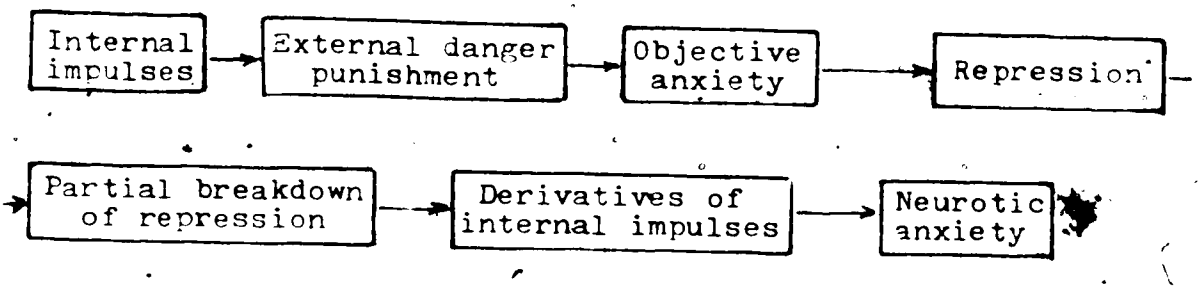

Figure 1. Relationship between Objective and Neurotic Anxiety.

Freud's theoretical views on anxiety, although continually modified, were never regarded as complete (Rangell, 1972), and this deficiency perhaps accounts in part for the diverse shades of opinion held by other psychoanalysts.

Learning Theory Approach. Those who support this theoretical position would perhaps agree with the definition offered by Estes and Skinner (Doyal & Friedman, 1974)

> Anxiety [they postulate] results when a neutral stimulus is followed by a primary aversive stimulus. When this is repeated the neutral stimulus takes on the function of a conditioned aversive stimulus. The observed behaviour that results from this operation is termed anxiety (p. 161).

According to Fischer (1970) the first significant attempt to explain anxiety using this conceptual framework, was made by Mowrer (1950). Mowrer contends that

> ... anxiety comes, not from the acts which the individual would commit but dares not, but from acts which he has committed but wishes that he had not. (p. 537)

Mowrer's formulations differ from those of the psychoanalysts in that he conceives anxiety to be a learned behaviour. Another point of departure is his contention that anxiety and fear are synonymous terms--a contention that has never been seriously questioned by other learning theorists (Fischer 1970).

Other theorists who support the learning-theory position are Dollard and Miller (1950) and Eysenck and Rachman (1965). In Eysenck's formulations, however, greater emphasis is placed upon influence of hereditary and constitutional factors than on that of learning.

A scrutiny of the two positions reveals some similarities. The principle of reinforcement in the learning theory

is substituted for Freud's "pleasure principle", and the "mechanism of repression" is re-designated as the "inhibition of cue-producing responses". It would appear therefore, that Fischer's claim about the learning theorists' formulations being a mere translation of the fundamental principles of psychoanalytic theory, is not without foundation.

Physiological Approach. The basic theoretical position of the physiologists is presented in the writings of Lindsley (1951) and Malmo (1957). Anxiety is conceived by these theorists as the effect of stimulus conditions originating in the environment and mediated through specific structures of the central nervous system. This results in the secretion of hormonal substance and in the arousal of probably the entire organism.

These three basic positions represent a sample of the theoretical formulations in the area of anxiety. In this study, a somewhat eclectic approach is adopted. Anxiety is conceived as

> ...a sociopsychophysiologic phenomenon experienced as a forboding dread or threat to the human organism whether the threat is generated by internal, real, or imagined danger, the sources of which may be conscious or unconscious or whether the threat is secondary to actual environmental threats of a biosocial, biophysical, or biochemical nature. (Lesse, 1970, p. 13)

Anxiety--State and Trait. The theoretical position that is adopted in the present research is Spielberger's Trait-State concept of anxiety. Factor-analytic studies conducted by Cattell and Scheier (1958, 1961) identified two distinct anxiety factors which they named trait-anxiety and state-anxiety.

According to Cattell and Scheier (1958) and Spielberger (1966), state-anxiety is conceived as a transient type of emotional arousal that is precipitated by a specific set of conditions. Trait-anxiety, on the other hand, is a relatively long-term personality trait which creates in the individual a latent disposition to respond with overly high state-anxiety under conditions of stress or threat.

Spielberger's (1966) Trait-State conception of anxiety, described schematically in Figure 2, states that

> the arousal of A-states involves a sequence of temporally-ordered events in which a stimulus that is cognitively appraised as dangerous evokes an A-state reaction. This A-state reaction may then initiate a behaviour sequence designed to avoid the danger situation, or it may evoke defensive maneuvers which alter the cognitive appraisal of the situation. Individual differences in A-trait determine the particular stimuli that are cognitively appraised as threatening. (p. 17)

According to Spielberger and Gaudry (1971), the assumptions underlying this theory are:

a) An A-state reaction will be evoked for all situations that are appraised by the individual as threatening.

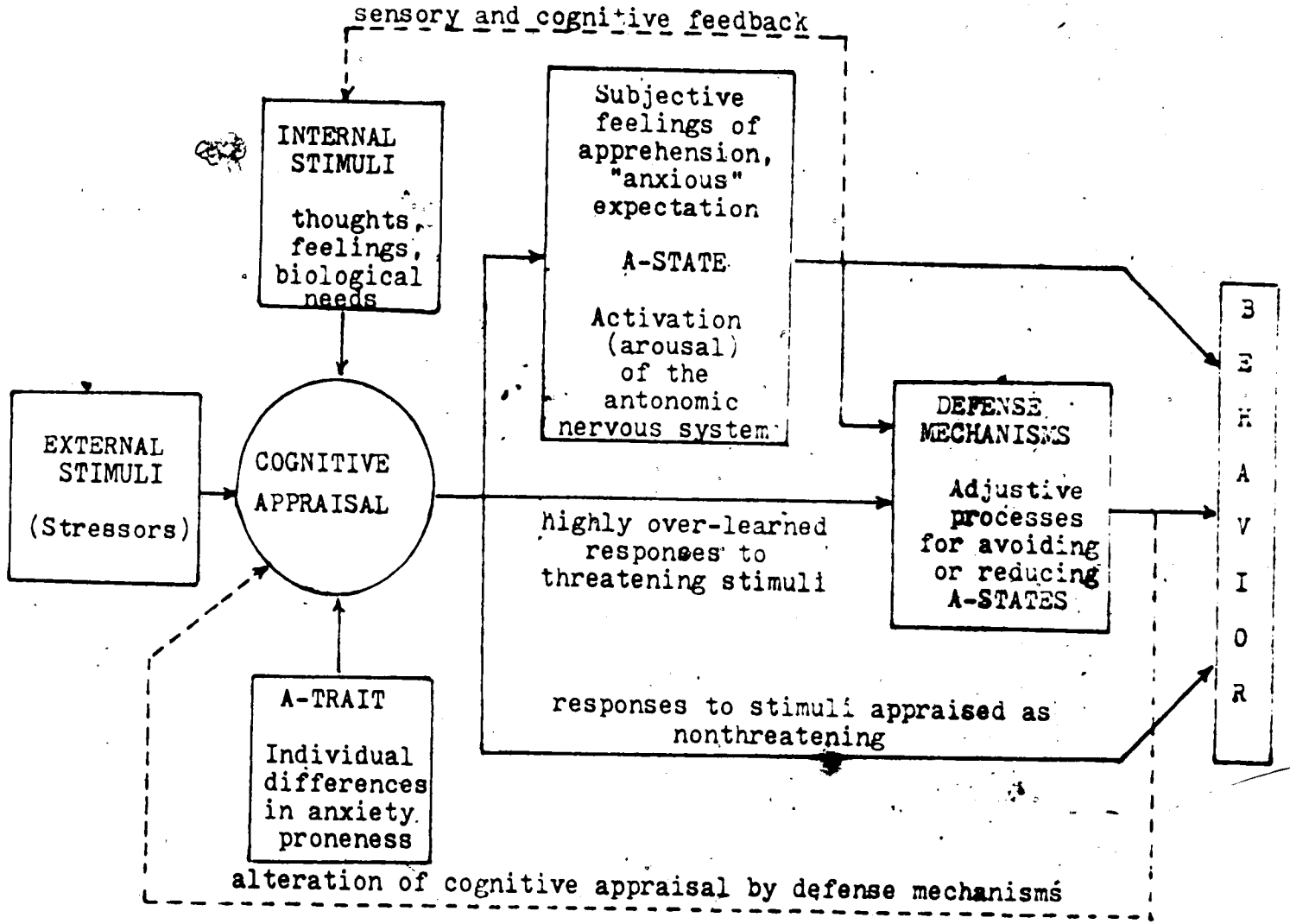

Figure 2. Spielberger's Trait-State Model of Anxiety

b) Individuals with high A-trait will tend to view situations that involve failure as more threatening than will those who are low in A-trait.

c) The intensity of the A-state reaction is proportional to the amount of threat perceived by the individual.

d) The duration of the A-state reaction is dependent upon the length of time that the situation is perceived as threatening.

e) High A-state is experienced as unpleasant through sensory and cognitive feedback mechanisms.

f) Rise in A-state has drive properties which may be expressed directly in behaviour or may activate psychological defense mechanisms that may have reduced the A-state in the past.

Phillips (1972), in his review of the major theoretical positions on this topic observed that though the explanations for the origin of anxiety have been diverse, they appear to be more complementary than contradictory.

It would appear, as he rightly noted, that there are a number of points at which the theories converge. There seems to be general agreement on the fact that anxiety is manifested physiologically, phenomenologically and behaviourally and differences between these indicators may be at least partly due to defensiveness on the part of the testees.

The state-trait conception of anxiety seems to be generally accepted and all of the researchers agree that the consequences of anxiety are usually negative. Phillips' synthesis of the theories are depicted schematically in Figure 3. The similarity between his model and that proposed by Spielberger is obvious.

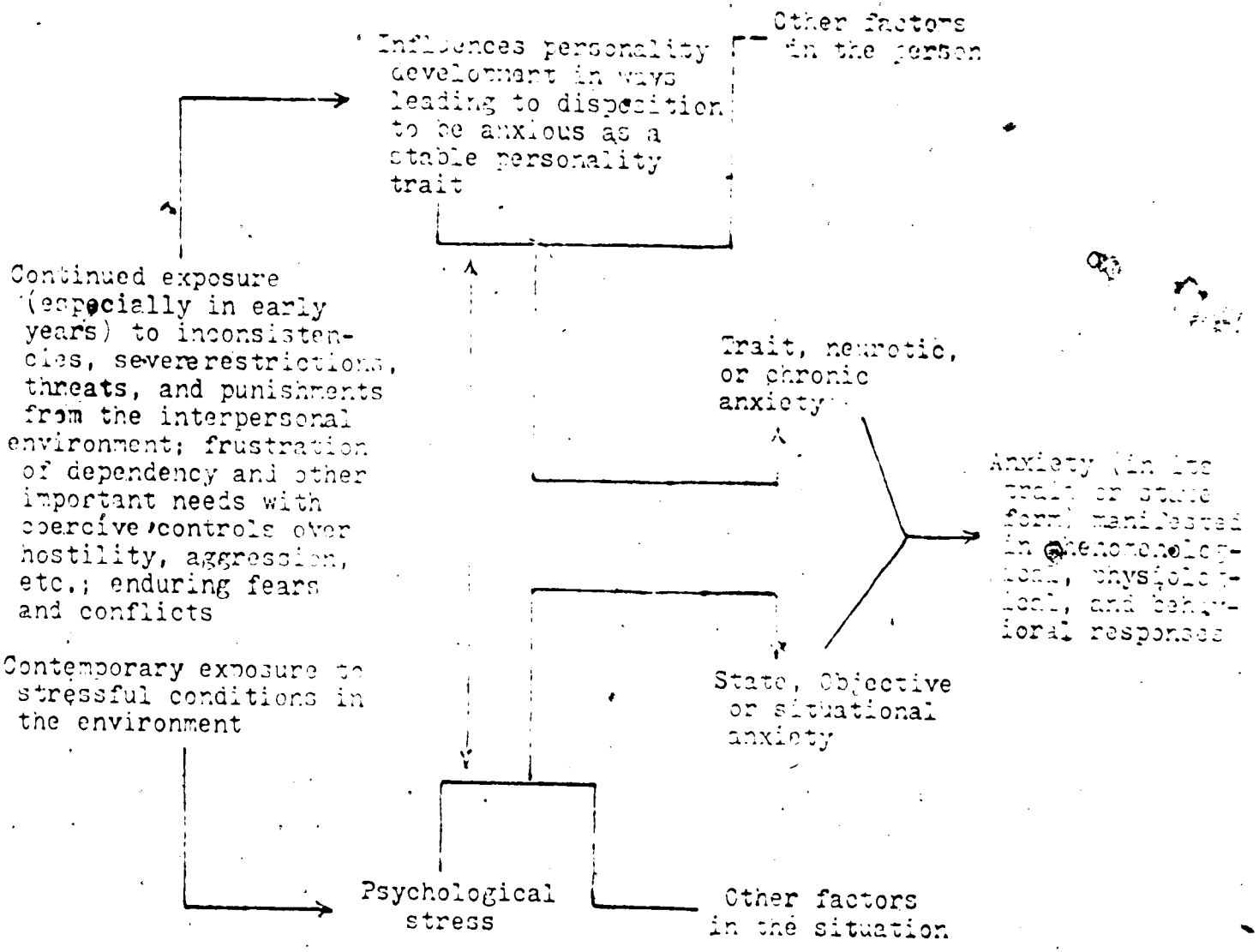

Figure 3. The nature of anxiety. (Phillips, 1972)

Test Anxiety

A specific form of state-anxiety, and one that is more germane to the present research is "Test Anxiety". This form of anxiety, as its name implies, is conceptualized as anxiety proneness in a specific situation--the test situation.

Sarason and his associates (1960) in their attempt to explain the nature and the source of [illegible], suggest that the overt manifestations of test anxiety are in reality a product of the individual's experiences in psychologically or interpersonally similar situations in the society and, more importantly, in the home. They posit that when these societal and familial experiences are aversive, the individual would tend to experience disruptive emotional reactions in dealings with authority-figures. Their position is supported by Phillips (1967) and Richardson (1973). However, Richardson adds, that other possible sources of test-anxiety could be inadequate test preparation and lack of ability on the part of the testee.

Richardson's contention about the lack of ability of the testee being a source of anxiety deserves closer scrutiny. By inference, this means that the individuals with the least ability should normally be among the most anxious in a test situation; but this claim is disputed by Gjesme (1972) who, in an analysis of the Achievement Motivation Theory (Atkinson 1964) contended that individuals of low

academic ability generally do not exhibit high levels of anxiety when confronted by a test or test-like situation. Perhaps a better explanation is that proffered by Sarason and his colleagues (1960). They admit the possibility of poor academic ability causing anxiety but argue that anxiety is the dominant causal factor in the relationship.

Components of Test Anxiety

The findings of research conducted by Liebert and Morris (1969), Spiegler and his associates (1968), and Morris and Liebert (1970) suggest that test-anxiety can be broken down into two major components--worry and emotionality. They conceive worry as the cognitive component which involves expression of concern about one's performance e.g. thinking about the consequences of failure, or expressing doubts about one's ability to perform adequately. The other component refers to the physiological and affective reactions to the stress of the test situation.

Morris and Liebert (1970) conducted two studies with samples from the college and high school populations in the United States. They found a significant negative correlation between test-anxiety and test-performance. They then eliminated the variance due to emotionality and found no change in the correlation; but when the variance due to worry was partialled out, the correlations dropped to non-significance. It would thus appear that it is the "worry" component of test-anxiety which adversely affects performance.

Test Anxiety and Academic Performance

The relationship between test anxiety and test performance is, according to Spielberger (1966), somewhat complex in that it depends upon the age, social class, sex and intelligence of the population under review.

Various theories have been advanced to explain the nature of the relationship. Some researchers (e.g. Spence & Spence, 1966), conceive anxiety as being a general energizing drive. Under this theoretical position, the excitatory potential of a response tendency is assumed to be a multiplicative function of the initial strength of the particular response tendency and the level of drive.

These response tendencies, they hypothesize, are ordered in a habit hierarchy depending upon their initial strength. In simple learning situations the correct response ranks high in the habit hierarchy which in turn facilitates learning. However, when the task is complex, anxiety tends to interfere with learning initially but facilitates it eventually when, as a result of practice, the correct habit moves up in the hierarchy.

Sieber (1969) argues that if "memory traces" may be equated with "response tendencies", then this explanation could be extended to state that a high-anxiety state should reduce the availability of weaker memory traces. Thus during a complex task, responses which are not dominant to that particular task may become less available under condi-

tions of high drive or stress. It would appear however, that this theoretical formulation cannot adequately explain the relationship between anxiety and performance since it fails to acknowledge the importance of state-anxiety.

Another group of researchers (e.g. Mandler & Sarason, 1952) shares with the advocates of the position outlined above the conception that the relationship between anxiety and performance is a linear one. They, however, [illegible] the importance of the habit hierarchy and conceive test-anxiety to be determined more by the particular situation.

Mandler and Sarason hypothesize that two types of drives are generally present in the individual in the testing situation. There are "learned drives" which are a function of the nature of the task, the test material and the instructions. These include the need to achieve and to finish the task (S_T) and are reduced by task responses (R_T) which lead to the completion of the task.

The other type of drive is the "learned anxiety drive" which is a function of previously-learned anxiety reactions in the testing situation. This anxiety drive (S_A), they posit, elicits two general types of responses;

a) those which are specifically connected with the nature of the task (R_A) and which produce a feeling of inadequacy, helplessness or anticipation of punishment.

b) Those which relate directly to the completion of the task (R_{AT}) and which function like the (R_T) responses

There are intervening responses r_{at} and r_t which lead to the final response R_T. While R_{AT} and R_T responses lead to task completion, R_A interferes with task completion. Their position is described schematically in Figure 4.

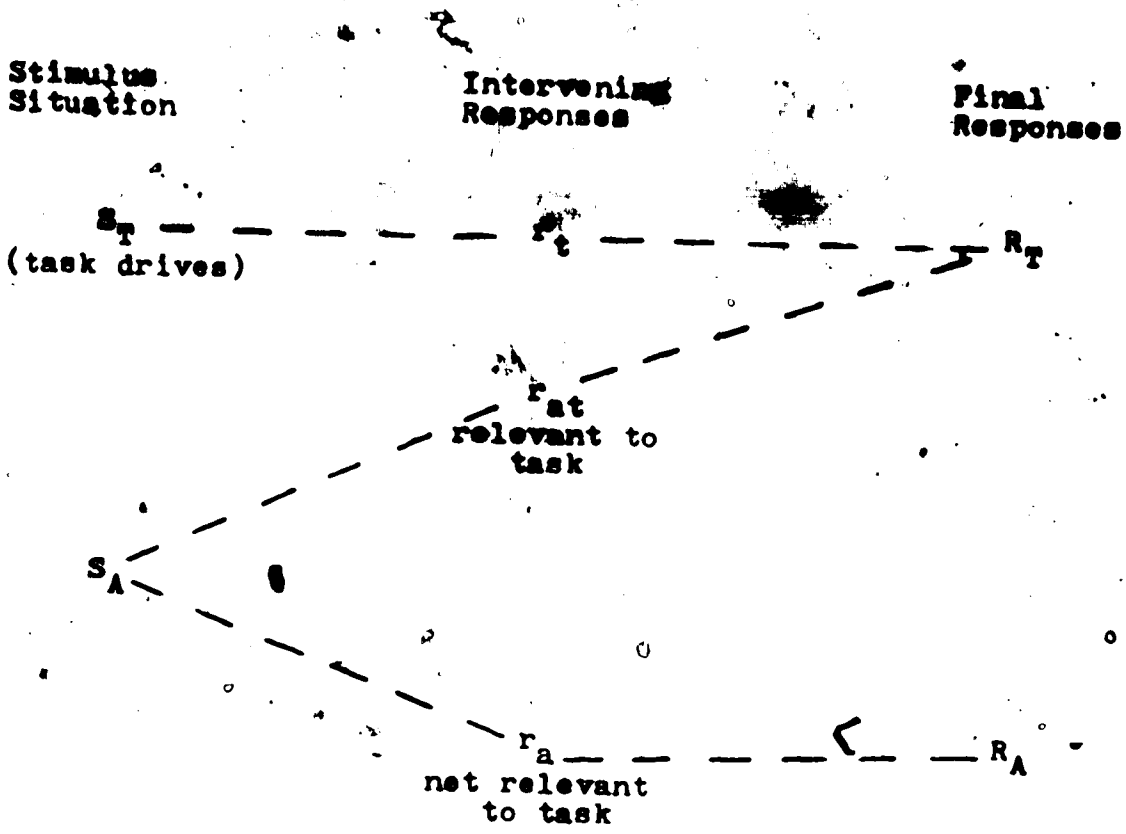

Figure 4. Drives and Responses evoked in the testing situation.

Thus, the individuals with a high anxiety drive and a large number of R_A responses in their response repertoire will tend to make more task-irrelevant responses initially than those individuals with low anxiety drive.

The converse is also true. Those individuals with low

anxiety drive will be apt to respond with more task relevant responses and consequently their performance should be better.

Eysenck (1957) in his review of the two positions presented here opine that not only are they compatible but they could very well be parts of the general Yerkes-Dodson Law. This law takes into account both the complexity of the task and the presence of state-anxiety, and conceives "drive" as having a curvilinear relation to performance. Intermediate levels of drive are optimal but too low or too high drive tends to produce sub-optimal performance. It states further that the optimum drive required for efficient learning is inversely related to the complexity of the task (Broadhurst, 1959).

This theoretical position predicts that on a task of medium difficulty, the moderate-test-anxious students should perform better than their low-test-anxious or high-test-anxious counterparts, but as the difficulty increases so too should the quality of work of the low-test-anxious, with a corresponding decrease in the performance of the high-test-anxious. Thus on a really complex task the low-test-anxious student will be expected to produce the best results. Conversely if the task is extremely simple then the high-test-anxious would be expected to perform significantly better than their moderate- and low-test-anxious counterparts.

A model that is strikingly similar to that suggested by the Yerkes-Dodson Law, is that proffered by Hebb (1955) and shown in Figure 5. He argues that without arousal no learning can take place, but on the other hand, high arousal tends to interfere with learning. There is therefore an optimal level below and above which performance tends to suffer.

In this research the theoretical position suggested by the Yerkes-Dodson Law will be the one adopted since this position acknowledges the importance of trait and state anxiety as well as the complexity of task.

What is perhaps significant, is that the findings of most of the studies investigating the Yerkes-Dodson Law support a linear rather than curvilinear relationship, but whether this lack of support for the curvilinear relationship is due to a possible flaw in the Yerkes-Dodson Law or to the use of faulty statistical procedures is a question that will require careful research. Many researchers (e.g. Bauer, 1975; Sarason et al, 1972) have confined their investigations to the high-test-anxious and low-test-anxious groups thus leaving unclear the effect of moderate anxiety on test performance.

A fact that is evident is that the studies done in this area are marked by inconsistent findings. Results range from "significantly negative" to "significantly positive". Warburton (1962) in his review of research that had been done in the United States prior to 1962, found that of the

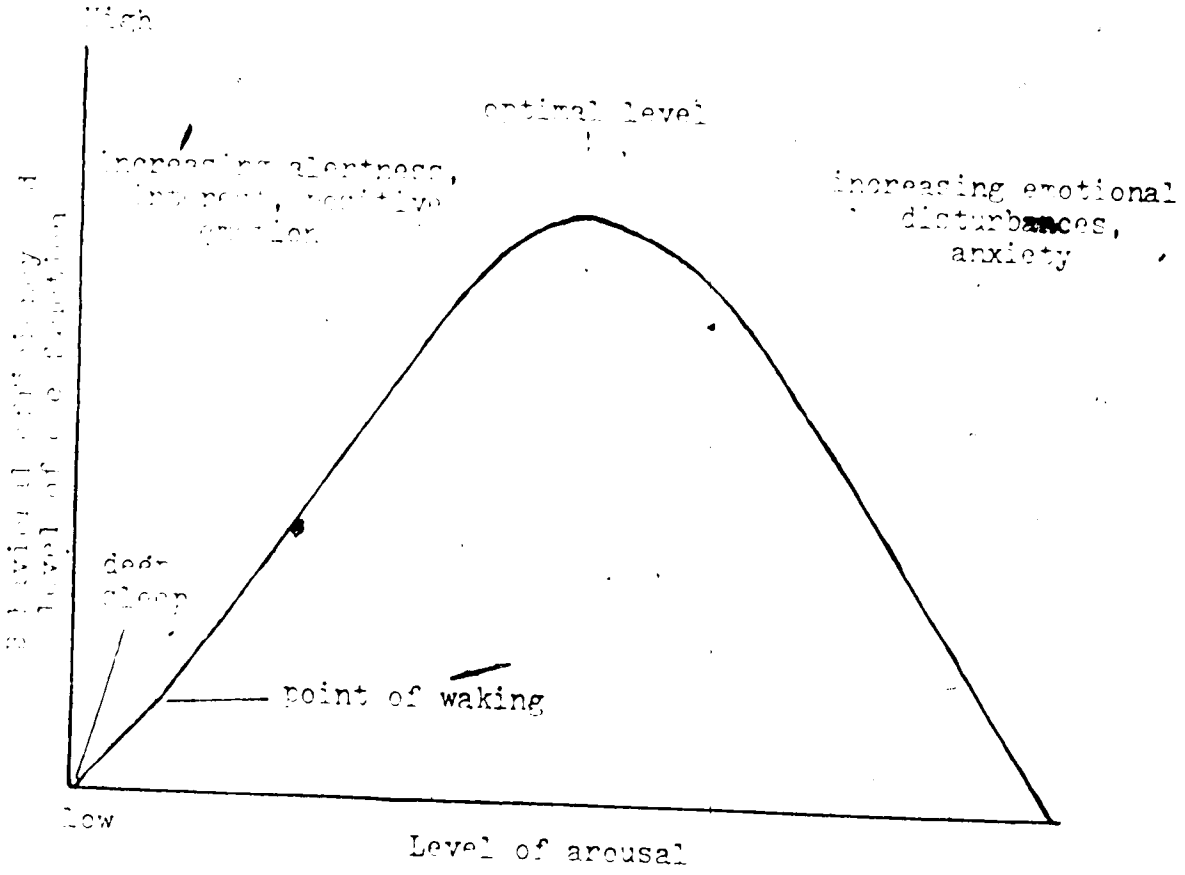

Figure 5. Hypothetical inverted U-shaped relationship between performance and level of arousal.

thirty studies he had seen, about 93 percent revealed a negative correlation between the two variables, and as Table 1 shows less than half (47 percent) of these were significant.

Table 1

Summary of Warburton's Findings

Anxiety vs School Achievement	Results
Significant negative correlation	13
Non-significant negative correlation	15
Zero correlation	1
Significant positive correlation	1

What is perhaps even more discouraging is that four years later, Rushton (1966) reported finding eleven positive correlations and sixteen negative ones in the twenty-seven studies he had reviewed.

Probable Reasons for the Discrepant Results

It is recognized that in studies of this nature there are certain variables which when present, serve to influence the results. Spielberger (1966) contends that one of the probable reasons for the inconsistencies that are apparent in the reported research, is the failure on the part of researchers to distinguish between anxiety as a transitory state and anxiety as a personality trait. Sarason (1960)

reports that the majority of the studies relating measures of trait-anxiety to measure of intellectual performance have yielded non-significant results. This conclusion was perhaps arrived at as a result of his research at Yale University (1957) in which he compared his General Anxiety Scale with his Test Anxiety Scale using the Scholastic Aptitude Test(SAT), the Mathematic Aptitude Test (MAT), and Grade Point Average (GPA). His findings which are tabulated in Table 2 clearly reveal the superiority of the Test Anxiety Scale over the General Anxiety Scale as an indicator of the anxiety experienced in testing situations.

Support for this conclusion is found in the results of later studies (Meyers & Martin, 1974; Sarason et al, 1972; Eysenck, 1972). Eysenck argues that it is possible for an intelligent, well-prepared person scoring high on a measure of trait-anxiety, to enter the examination room quite calm simply because that particular testing situation might not provide the necessary stimuli for the high arousal of his anxiety. On the other hand, an individual low on the measure of trait-anxiety, may yet, because of poor preparation or weakness in that particular subject area to be covered by the test, find the testing situation highly anxiety-arousing. It is possible, therefore, as is apparent from Table 2, that if a trait-anxiety scale is used, conflicting results could be obtained even when the same sample is used.

Table 2

Correlations among Anxiety Scales,
Grade point Averages and Achievement Measures

Anxiety Scale	SAT	MAT	GPA			
			1st yr	2nd yr	3rd yr	4th yr
Test Anxiety Scale	-.14*	-.20*	-.14*	-.17*	-.06*	-.003
General Anxiety Scale	.10	-.003	.19**	.19**	.11	.14*

* $P < .05$
** $P < .01$

Note: From Test Anxiety, General Anxiety and Intellectual Performance by I. Sarason, Journal of Consulting Psychology, 1957, 21, 6, 485 - 490

Another variable that seems to exert some influence on the results of studies of this nature, and one which could explain in part the inconsistencies found, is the complexity of the task (Martin, 1972; Gjesme, 1972). They hypothesize that when the task is simple in relation to the children's ability, little test anxiety is generated and the high-test-anxious tend to perform as well as their low-anxious peers.

Hambleton (1968), Towle and Merrill (1972), and Thurner and Wennehorst (1972) found that by merely arranging the test items in descending order of difficulty, more anxiety could be aroused with a consequent decrement in performance.

It is becoming increasingly clear that cultural factors play an important role in such studies. Bronzaft and his associates (1974) compared forty Negroes at a New York college with sixty-five at the University of the West Indies. They found that the West Indian University students possessed significantly higher facilitating test-anxiety (motivation) and lower debilitating test-anxiety than their New York counterparts, and they attributed these differences to the background and cultural experiences of the two samples.

It must be noted, however, that their findings do not necessarily suggest that West Indian students are less anxious than American students. They drew their American sample from one of the minority groups in the United States and researchers have found the anxiety level in minority groups in the

United States to be significantly higher than the white section of the population (Phillips, 1972).

Paschal and Kuo (1973) compared representative samples of American and Chinese College students and found the Chinese students to be significantly more anxious than the Americans, and their findings are consistent with those obtained earlier by Lian-Hwang-Chiu (1971) in his research with samples from the same two cultures. These researchers are unanimous in their contention that the difference found is due to cultural factors as well as the educational systems. They traced the children's attitude towards tests to the child-rearing practices in the two cultures and posited that the higher test-anxiety levels found in Chinese children is a direct result of the strict parental control they experience.

The American children on the other hand, grow up in a more permissive environment and therefore do not perceive the test situation as threatening to their self-esteem, as do their Chinese counterparts. The Chinese educational system was perceived by these researchers to be test-dominated, more selective, and consequently more anxiety arousing than that of the United States.

Perhaps it is not without significance that Lynn (1
Furneaux (1956) and Rushton (1966) who reported findings
inconsistent with the general trend, all worked with samp
drawn from British educational institutions or reviewed

studies based on English children.

In the case of Furneaux, his sample happened to be a select group of successful university students; but, as Eysenck (1972) states, it is possible to find a positive relationship between the two variables under review at the university level in Britain because of the high degree of selectivity and the resultant elimination of the high-test-anxious in the process. According to his arguments, the ones who succeed at university level in that country are the able low-test-anxious as well as the high-test-anxious who have been successful in controlling their anxieties. Perhaps similar arguments could be used to explain Bronzaft's observation about West Indian University students since there are striking similarities between the educational systems in the West Indies and Britain.

Sarason and his associates (1960) using samples comprising 597 American and 533 English children found that although the two groups were similar with respect to trait-anxiety, the English children exhibited a higher level of test-anxiety--a phenomenon which they attributed to the difference in the educational systems.

Sex is another variable which must be considered in studies related to anxiety, for sex differences in anxiety measured by questionaire or self-report inventories have been consistently obtained, with girls showing higher scores (Sarason et al, 1960).

It is felt that this difference is not an indication of girls being more anxiety-prone but rather it is indicative of the defensiveness on the part of boys to admitting anxiety.

Sarason (1963) suggests that in western societies boys are not encouraged to admit to being anxious since such an admission would somehow be a reflection on their masculinity. He found significant differences between boys and girls in the correlation of anxiety with performance on the School and College Ability Test. The correlations for the boys and girls were found to be .55 and -.27 respectively.

Another factor which could account for the inconsistensies alluded to earlier is perhaps the failure on the part of the early investigators to recognize the importance of the social class of the samples used.

It has become clear that lower-class minority status youngsters reveal consistently higher levels of anxiety than other lower class children (Phillips, 1966); in addition Dunn (1968) reports that lower-class children tend to be more anxious than their middle-class counterparts.

These are perhaps some of the important variables which tend to influence the findings of research in the area of anxiety, but which to some extent were not seriously considered in some of the earlier studies.

Within recent times, investigators have shown greater awareness of the importance of the factors discussed and

some effort has been made to control them. This has resulted in more consistent findings.

Illustrative of these recent studies is that done by Oros and his associates (1972). They investigated the effects of anxiety on the Wechsler Intelligence Scale for Children. They controlled trait-anxiety and then gave anxiety-arousing instructions to one randomly-selected group and anxiety-allaying instructions to the other. Significant differences were found between the means of the two groups in favour of the low-test-anxious group on all but one of the sub-tests.

Young and Brown (1973) in their study controlled intellectual ability using previously-determined intelligence quotients and obtained similar results. Another carefully designed study is that reported by Osterhouse (1975). He worked with a sample of 412 undergraduates (44 percent males and 56 percent females) at the University of Maryland. His findings were consistent with the general trend. The low-test-anxious students obtained higher scores than their moderate-test-anxious and high-test-anxious peers in both anxiety-allaying and anxiety-arousing conditions.

These findings coincide with those of other recent studies (Wine, 1971; Mandelson, 1973; O'Neil, 1973; Simons, 1974; Sarason, 1973; Smith et al, 1971; Sinha, 1972; Martin & Meyers, 1974; Bauer, 1975).

It is evident that despite the inconsistencies of

lier findings, the bulk of the evidence of more recent studies support the general hypothesis which predicts a negative correlation between test-anxiety and test-performance.

CHAPTER III

Definitions and Hypotheses

Definitions

Test Anxiety. In this study test-anxiety is operationally defined as the affect measured by the Test Anxiety Scale for Children (TASC). The test-anxious child will in reality be the "one who admits to tension, worry and feeling upset before, during and after taking tests." (Sarason et al, 1968, p. 493)

Low-Test-Anxious. It is assumed that the affect anxiety is normally distributed in the population. An individual is thus categorized as low-test-anxious if on the TASC he or she scores below the twentieth percentile.

Moderate-Test-Anxious. This group includes all students in the sample whose scores lie between the twentieth and eightieth percentiles.

High-Test-Anxious. This category includes all students in the sample whose scores lie above the eightieth percentile.

These three categories represent rough approximations of the proportions that would ordinarily have fallen between (minus three and minus one), (minus one and one), and (one

and three) standard deviations on the normal curve.

Hypotheses

The weight of the evidence provided by the studies reviewed tends in general to support the following hypotheses.

Hypothesis 1. There is a significant negative correlation between test-anxiety and test-performance among seventh-grade students.

Hypothesis 2. In anxiety-allaying conditions there are no significant differences in performance among high-test-anxious, moderate-test-anxious and low-test-anxious students.

Hypothesis 3. In anxiety-arousing conditions there is a significant difference in performance between the low-test-anxious and moderate-test-anxious students.

Hypothesis 4. In anxiety-arousing conditions there is a significant difference in performance between the low-test-anxious and high-test-anxious students.

Hypothesis 5. In anxiety-arousing conditions there is a significant difference in performance between moderate-test-anxious and high-test-anxious students.

Hypothesis 6. There is a significant negative correlation between test-anxiety and test-performance among seventh-grade boys.

Hypothesis 7. There is a significant negative correlation between test-anxiety and test-performance among seventh grade girls.

Hypothesis 8. In anxiety-arousing conditions there is a significant difference in performance between high-test-anxious boys and high-test-anxious girls.

Hypothesis 9. In anxiety-arousing conditions there is a significant difference in performance between moderate-test-anxious boys and moderate-test-anxious girls.

Hypothesis 10. In anxiety-arousing conditions there is a significant difference in performance between low-test-anxious boys and low-test-anxious girls.

CHAPTER IV

Method

Sample

The data for the present investigation are based on a sample of seventh-grade students from four All-age schools in Guyana. Two of the schools are located in the capital, Georgetown. The others are situated in a rural village about three miles east of the capital. These schools draw children primarily from the middle and lower socio-economic levels of the Guyanese society.

The total number was originally 400 (200 boys and 200 girls) but three students who did not complete both tests were eliminated. More detailed information on the sample and on the schools from which it was randomly drawn is shown in Table 3.

Table 3

Description of the Sample

School	Location	Boys	Girls	Total
Sacred Heart R.C.	Urban	60	60	120
Carmel R.C.	Urban	77	88	165
St. John's R.C.	Rural	34	26	60
Plaisance Government	Rural	28	24	52
TOTAL		199	198	397

These students represent the normal seventh-grade population. It must be noted however, that in Guyana all children between the ages 10 - 12 write the National Secondary Schools Entrance Examination during April. A certain percentage of the best students is then granted Government support to attend the Government and Government-aided Secondary Schools. The seventh-grade population then is in reality the portion of the sixth-grade population that failed to win places in the secondary schools.

In order to test the major Hypotheses, the sample was randomly assigned to two groups--a control group numbering 194 and an experimental group with 203 students.

The testing Instruments

The two instruments used were an achievement test and an anxiety scale. The Achievement Test is a modified form of the Secondary Schools Entrance Mathematics Test used in Guyana in 1972. This test consists of 50 items designed to measure achievement in the following content areas: logic, numeration, computation, weights and measures, scale drawing, and mensuration. (See Table 4)

A mathematic test was chosen because, as Lunneborg (1964) found from his studies, mathematics is one of the subjects most susceptible to the deleterious effect of anxiety.

In order to increase the complexity of the task, the

Table 4

Blue Print of the Test Content

Content Area	Items
Logic	39
Numeration	
Use of symbols for numbers	1, 2, 3
Place value	5, 6
Rounding numbers	27
Computation	
The four rules--whole numbers	4, 7, 8, 9, 11, 14, 28, 33, 42, 46, 47
The four rules--vulgar fractions	15, 20, 21, 26, 49
The four rules--decimal fractions	10, 16
Percentage	32
Order of operations	13
Average	30, 43
Unequal sharing	31, 38
Profit and Loss	37, 50
Simple Proportion	44
Weights and Measures	
Length	23, 24, 25
Dry Measure	19
Time	18, 22
Weight	36, 41
Scale Drawing	40
Mensuration	
Area	34, 35, 45
Volume	17

least difficult items on the original test were replaced by items of above-average difficulty. As can be seen from Figure 6, the revised instrument proved to be difficult for both groups in the sample.

The reliability coefficient obtained by the Kuder-Richardson method was found to be .72 for the control group and .69 for the experimental group. The standard errors of measurement for the two groups were 3, and 2.9 respectively.

These statistics appear to be reasonable in view of the homogeneous nature of the sample. However, they should be interpreted with caution for there were indications that a number of students failed to finish the test, and, as Mehrens and Lehmann (1972) assert, when tests are speeded as this obviously was, reliability coefficients obtained by the KR-20 method tend to be spuriously high.

This instrument was examined by personnel from the Test Development Unit, Ministry of Education (Guyana). They considered its content validity as well as its face validity to be reasonably high.

The Anxiety Scale

There are, according to Krause (1961), six types of evidence for transitory anxiety.

(a) response to stress
(b) physiological signs
(c) clinical intuition
(d) free molar behaviour

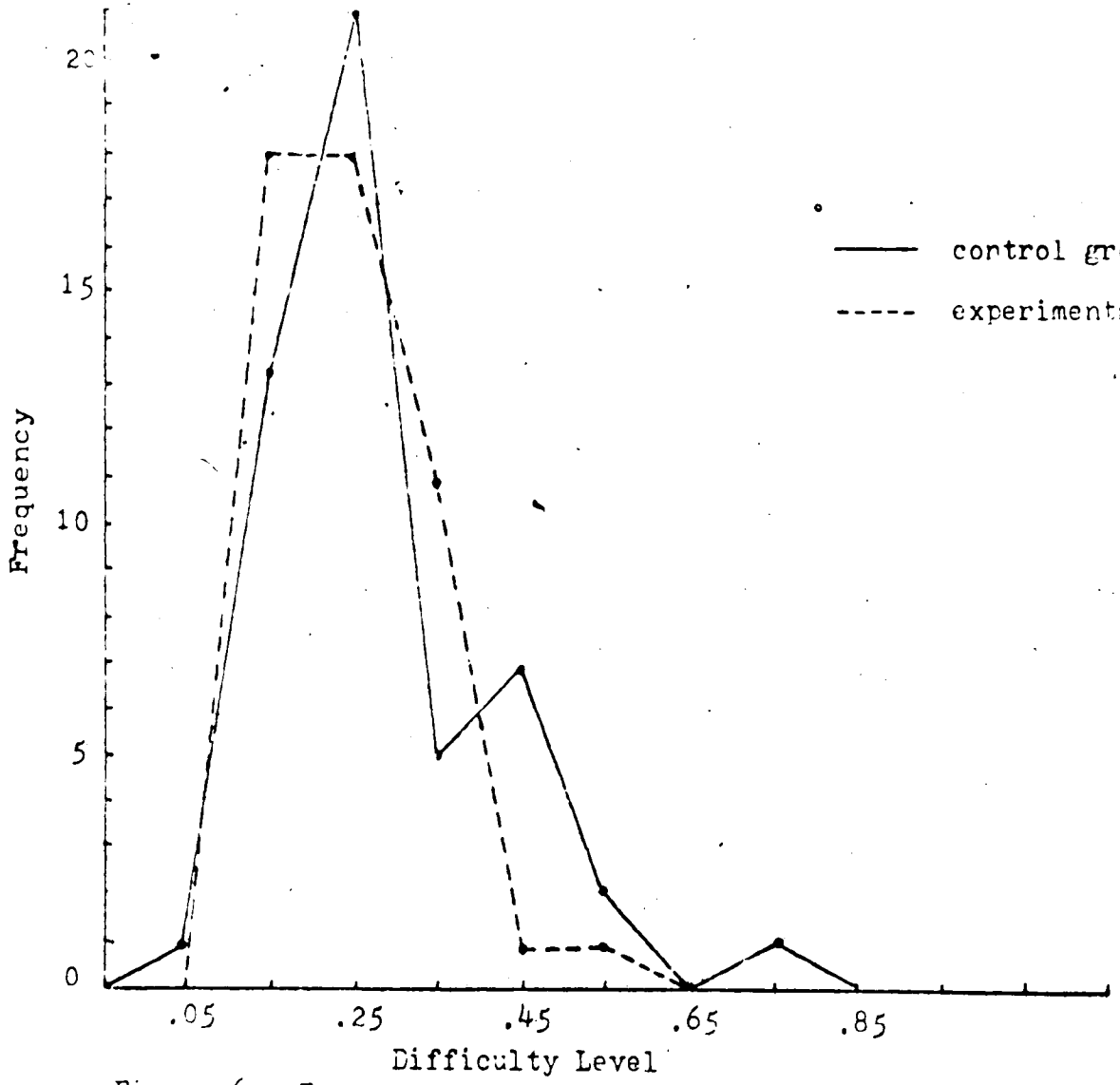

Figure 6. Frequency polygon showing item difficulty.

(e) task performance changes
(f) introspective report.

In this study the type used was the introspective report, and the scale chosen to operationalize anxiety was the "Test Anxiety Scale for Children" (TASC). This scale was developed by Sarason and his colleagues (1960) as a measure of anxiety that is experienced by children in tests or test-like situations.

The TASC consists of thirty questions about school tasks and test situations (see appendix A). These are read to the students who then respond by indicating "yes" or "no". The score is then computed by adding all the "yes" responses.

This scale was developed with reference to the Freudian concept of anxiety. The designers share with Freud the belief that anxiety has three attributes, "1) a specific unpleasurable quality, 2) efferent or discharge phenomena, and 3) perception of these." (Freud, 1949, p. 70). They contend that though a child might be unaware of the unconscious significance of the anxiety-reaction, he is aware of the unpleasant state through which anxiety manifests itself and consequently he should be able to communicate his feelings to others.

Doyal and Forsyth (1973) report a test-retest reliability coefficient of .65 for both boys and girls over a four-month period. This is reasonably high in view of the fact that anxiety scores are expected to fluctuate according

to the nature of the task and the amount of anxiety-arousing stimuli in the testing situation.

Various studies designed to determine the validity (concurrent and predictive) of this scale are reported in the literature. In one of the initial studies, the instrument was compared with Teacher Ratings on a sample of 2,211 pupils in Connecticut. The correlation coefficients ranged from .09 to .31. The low correlations were attributed to discrepancies observed in the teachers' ratings. (Sarason et al, 1960)

The designers of the instrument later compared the TASC with intelligence and achievement, and, as they had hypothesized, the correlations with the intelligence scores were all negative ranging between -.012 to -.284 while those with the achievement scores ranged between -.002 to -.294.

Some investigators (Feld & Lewis, 1967; Dunn, 1965) explored the stability of the factor structure of the scores obtained on the TASC. The two studies produced strikingly similar results. Approximately 40 percent of the variance was attributed to test anxiety, 16 percent to remote school concerns, 20 percent to poor self-evaluation, and 24 percent to somatic signs of anxiety.

Although it was specifically designed for children, the instrument was correlated with a measure of trait-anxiety (Manifest Anxiety Scale) using a sample consisting of freshmen and sophomores at the University of Washington.

Coefficients of .41 (males) and .49 (females) were obtained (Sarason, 1959). These correlations appear to be consistent with the theory underlying anxiety, for though the two instruments are presumably measuring different forms of anxiety, there is naturally some overlap.

Of particular importance to this study is the research undertaken by some investigators to determine the validity of this instrument across cultures. Sarason and his colleagues (1960) compared samples from Britain and the United States, while Kaneda (1971) investigated the suitability of the scale for Japanese children. Both studies found in the TASC a suitable instrument for use in cultures other than the United States.

There is a deficiency inherent in self-report scales. An individual may respond dishonestly or defensively for a variety of reasons and when such reporting occurs it generally goes undetected. (Nighswander, 1969)

Three of the common reasons for inaccurate reporting are social desirability, acquiescence, and position set. "Social desirability" refers to the type of reporting which occurs when the tester answers the way he thinks the tester expects him to respond. "Acquiescence", on the other hand is the tendency to agree with whatever statement is presented even though the statements might be expressing completely opposite ideas. This is of particular significance to this study since the score on the anxiety scale used is the sum

of the "yes" responses.

The third type of responding known as the "position set" refers to the tendency of testees to respond in a fixed manner. Some testees mark all answers that appear on the right-hand side of the answer sheet, while others mark those that appear on the left. Still others alternate their responses between left and right. Like acquiescence, the position set must be considered when the TASC is used as all "no" responses appear on the right-hand side of the answer sheet and the "yes" responses on the left.

The designers of the TASC were aware of this problem and conducted studies to ascertain the effect of acquiescence on the TASC scores. Their findings revealed the presence of these response sets but they did not consider the effect to be of great significance (Sarason et al, 1960). They did observe a lesser tendency among children to answer defensively when the scale was administered by their own teachers provided the undertaking was given that the scores would not be seen by the teachers concerned.

While these deficiencies cannot be ignored, the consistency of the findings of studies made with this scale certainly attests to its predictive validity, and it was this ability as a predictor of achievement and also its practicality in the Guyanese situation that were the primary reasons for it being chosen over the other anxiety measures.

Procedure

The experiment was supervised by an official from the Ministry of Education, Guyana. As indicated earlier, the sample was drawn from four schools. In three of these all students in Grade Seven were allowed to participate in the experiment but in the fourth, boys and girls were selected separately and randomly in order to ensure equal representation for the two sexes.

The boys selected then drew numbers. Those with odd numbers were assigned to the experimental group and the even numbers to the control group. The same procedure was used to assign the girls.

The anxiety scale was then administered to the children in their own classrooms under the supervision of their regular teachers. The questions were read following the instructions outlined in appendix B and the students responded by putting a circle around either "yes" or "no" on a previously-prepared answer sheet. (See appendix C).

The Achievement Test was administered to the experimental group on the following Saturday. This group wrote the test at two centres under instructions designed to arouse anxiety. (See appendix E)

On the following Monday, the control group wrote the same test in their own classrooms, supervised by their regular teachers and with instructions designed to allay their anxiety. (See appendix E).

The answer sheets for the Achievement Test and the Anxiety Scale were then forwarded to the author for processing and analysis.

CHAPTER V

Results

Statistical Analysis

The design of this study was a 2 x 3 x 2 factorial, involving the two sexes, three anxiety levels (low, moderate and high), and two anxiety conditions (anxiety-allaying and anxiety-arousing).

The three anxiety levels were determined on the basis of the students' scores on the anxiety scale. The high-test-anxious group represented the top 20 percent of the sample, the low-test-anxious level consisted of the bottom 20 percent, and the moderate-test-anxious group contained the middle 60 percent. This procedure was employed with both the control and experimental groups, and it resulted in unequal observations in the cells. (See Table 5)

Table 5

Distribution of sample showing observation in each cell.

Anxiety Level	Control Group		Experimental Group	
	B	G	B	G
Low	31	9	19	21
Moderate	54	60	66	57
High	11	29	18	22

In order to minimise the disparity among the observations in the cells and thus to improve the accuracy of the analysis of variance, a random sample of 80 students was chosen from the moderate-anxious groups. This resulted in the distribution shown in Table 6.

Table 6

Distribution of Reduced Sample showing Cell-Frequencies

Anxiety Level	Control Group		Experimental Group	
	B	G	B	G
Low	[illegible]	9	19	21
Moderate	19	21	20	20
High	11	29	18	22

As can be seen from the table, there are 80 students in each of the anxiety groupings. These data were then analyzed using three computer programmes (ANOVA 35, SSPS and DEST 02).

The ANOVA 35 programme, constructed by Dr. K. Bay and Dr. S. Hunka of the University of Alberta, is designed to compute a three-way analysis of variance with equal or unequal number of observations in the cells.

The reduced sample (N = 240) was used for this analysis which yielded the following statistics. The mean achievement scores for the twelve cells are shown in Table 7.

Table 7

Cell Means for the Achievement Measure

Anxiety Level	Control Group		Experimental Group	
	B	G	B	G
Low	17.23	16.22	17.37	[illegible]
Moderate	13.00	15.48	11.85	12.5
High	11.82	13.28	9.22	11.64

The tendency for the low-test-anxious group to score higher on the achievement test than either of the other two groups is evident.

The mean achievement scores for the two sexes, the three anxiety levels and the two treatment conditions are tabulated in Table 8. The differences between the sexes and those between the two conditions appear to be somewhat small.

The summary of the three-way analysis of variances is presented in Table 9. The analysis reveals significant main effects due to anxiety, but shows no significant interactions.

Multiple comparisons (Scheffé) were made on the anxiety effects. A summary of the findings presented in Table 10, reveals significant differences between the low-test-anxious group and the other two anxiety groups.

The data were next analysed using the TREST 02 computer programme designed by Bay (1969) which computes the correla-

Table 4

Mean Achievement Scores for three variables

Sex		Anxiety Level			Condition	
B	G	Low	Moderate	High	A-allaying	A-arousing
13.93	13.47	15.91	13.24	11.71	14.73	13.18

Table 9

Summary of the Analysis of Variance
for the Achievement Measure

Source	SS	DF	MS	F-Ratio	P	Decision
Sex (S)	36.69	1	36.69	1.12	.29	N.S
Anxiety (A)	991.01	2	495.5	15.16	.00	SIG*
Treatment (T)	98.08	1	98.08	3.0	.08	N.S
S x A	88.23	2	44.11	1.35	.26	N.S
A x T	56.15	2	28.07	.86	.42	N.S
S x T	1.21	1	1.21	.04	.85	N.S
S x A x T	18.83	2	9.42	.29	.75	N.S
Errors	7450.51	228	32.68			

* $p < .01$

Table 1[illegible]

Summary of Scheffé Multiple Comparison
on [illegible] Effects

Contrasts	[illegible]	Variance ψ	F	DF	[illegible]	Decision
Low-Moderate	[illegible]	.31	[illegible]	2,22[illegible]	.0[illegible]	SIG*
Low-High	[illegible]	.3[illegible]	14.6[illegible]	2,22[illegible]	[illegible]	SIG*
Moderate-High	1.71	.3[illegible]	1.6[illegible]	2,22[illegible]	.1[illegible]	N.S

* p < .01

tion coefficient by the Pearson product-moment method. It also gives the means, variances and standard deviations of the distributions of the two measures (Anxiety and Achievement). These are presented in Table 11.

Correlation coefficients were then computed for the total sample, the control and the experimental groups as well as for the boys and girls in the experimental group. All coefficients were then subjected to the t-test for significance that is built into the DEST 02 programme. A summary of the results of those tests is presented in Table 12. It shows a significant negative correlation between the scores on the anxiety and the achievement measures for all of the groups under review.

The third computer programme (SSPS) was used to obtain a scattergram showing the relationship between the performances of the entire sample on the two measures. This scattergram is shown in Figure 7 and depicts graphically the negative trend indicated by the correlation coefficients.

Findings

The results obtained were generally in congruence with the theoretical formulations that were adopted. The hypotheses, restated here for convenience, are dealt with separately.

Hypothesis 1. There is a significant negative correlation between test-anxiety and test-performance.

Table 11

Means, Variances and Standard Deviations
for the two Measures

Group	Anxiety Measure			Achievement Measure		
	$\bar{X}$	VAR	SD	$\bar{X}$	VAR	SD
Control (total)	17.58	43.41	6.59	14.73	36.33	6.03
Experimental (boys)	16.61	34.27	5.85	12.86	46.12	6.79
Experimental (girls)	17.1	38.47	6.20	13.48	28.69	5.36
Experimental (total)	16.87	36.53	6.04	13.18	37.07	6.09
Total	17.22	40.10	6.33	13.95	37.29	6.11

Table 12

Summary of Significance Tests [illegible] Correlation Coefficients for th[illegible] Achievement and Anxiety Scores.

Group	Pearson "r"	t	df	Prob
[illegible]rol (total	-.[illegible]	-[illegible]	11	.[illegible]
Experimental (total)	-.[illegible]	-[illegible]	11	.[illegible]
Experimental (boys)	-.[illegible]	-[illegible]	05	.[illegible]*
Experimental (girls)	-.[illegible]	-[illegible]	01	.[illegible]*
Total Sample	-.[illegible]	-[illegible]	[illegible]	.[illegible]**

* $p < .05$
** $p < .01$

The results confirmed this hypothesis. As predicted by the theory, the students who scored high on the anxiety scale showed a tendency to score low on the achievement measure. Conversely, those who obtained low scores on the anxiety scale tended to gain high scores on the achievement test. ($r = -.27$, $t = -4.39$, $df = 238$, $p < .01$)

Hypothesis 2. In anxiety-allaying conditions there are no significant differences in performance between the low-, moderate- and high-test-anxious students.

This was not confirmed. While the difference between the moderate- and high-test-anxious groups did not reach statistical significance ($p > .05$) the differences observed between the low-test-anxious group and the other two groups proved to be significant. ($p < .01$)

Hypothesis 3. In anxiety-arousing conditions there is a significant difference in performance between the low- and moderate- test-anxious students.

This was confirmed. The performance of the low-test-anxious group was of a significantly better quality than that of the moderate-test-anxious group. ($F = 7.07$, $df = 2,228$, $p < .01$)

Hypothesis 4. In anxiety-arousing conditions there is a significant difference in performance between the low- and the high-test-anxious students.

This was confirmed. A significant difference in favour of the low-test-anxious group was found. ($F = 14.63$, $df = 2,228$, $p < .01$)

Hypothesis 5. In anxiety-arousing conditions there is

a significant difference in performance between moderate- and high-test-anxious students.

This was not confirmed. ($F = 1.69$, $df = 2,228$, $p > .05$).

Hypothesis 6. There is a significant negative correlation between test-anxiety and test-performance among seventh-grade boys.

This was confirmed. The boys who performed well on the achievement test tended to have low scores on the anxiety scale. ($t = -3.03$, $df = 55$, $p < .01$)

Hypothesis 7. There is a significant negative correlation between test-anxiety and test-performance among seventh-grade girls.

This was confirmed. Like the boys, girls who scored high on one instrument showed a tendency to score low on the other. ($t = -2.38$, $df = 61$, $p < .05$)

Hypotheses 8, 9, and 10. In anxiety-arousing conditions there is a significant difference in performance between
(a) low-test-anxious boys and low-test-anxious girls
(b) moderate-test-anxious boys and moderate-test-anxious girls
(c) high-test-anxious boys and high-test-anxious girls.

These hypotheses were not confirmed. The results of the analysis of variance revealed no significant effects that could be attributed to sex. Thus no further tests relating to these hypotheses were performed.

Another finding that would perhaps be of interest to researchers is the difference found between the mean scores of the boys and the girls on the anxiety measure. (see Table 13)

Table 13

Means and Standard Deviations on the Anxiety Measure

Group	$\bar{X}$	S.D
Boys	16.28	5.17
Girls	18.5	5.15
Total	17.44	5.19

This difference was tested using the t-test for independent means (Ferguson 1971). The results showed the difference to be statistically significant. ($t = 3.31$, $df = 238$, $p < .05$)

Conclusions

On the basis of these findings the following conclusions can be drawn:

Anxiety, as measured by the TASC is inversely related to performance on a mathematics test. Contrary to the findings obtained in similar studies in North America and Europe, it does not appear as if this relationship is significantly affected by sex in the Guyanese society.

When students perform complex tasks under conditions of stress the ones who are low in test-anxiety tend to perform significantly better than their moderate- and high-test-anxious peers.

The findings support the observation made by other researchers that on self-report scales measuring anxiety, girls tend to obtain significantly higher scores than boys.

CHAPTER VI

Discussion and Implications

Pearson Correlations

The results of this investigation confirm the hypothesis that predicts an inverse relationship between test-anxiety as defined by the TASC and test-performance. They are also consistent with the findings reported by several other researchers (Osterhouse, 1975; Bauer, 1975) who have examined the educational correlates of these self-report measures of anxiety.

The correlation coefficient obtained (-.27), though significant, is somewhat modest and suggests a low degree of association between the two variables. However, it compares favourably with those reported in similar studies (e.g. Cowen et al, 1971). The coefficients obtained in the initial validation studies ranged between -.002 and -.294 (Sarason et al, 1960). In fact, under the theoretical position adopted in this study (i.e. the curvilinear relationship between anxiety and test-performance), it is expected that the correlation coefficient obtained by the Pearsonian method will be low. (Minium, 1970)

A graphic representation of the relationship is shown in Figure 7. No curvilinear characteristics are evident from this distribution, but the distribution does appear to

be consistent with the theory underlying the relationship between the two variables.

According to the Yerkes-Dodson law discussed earlier, there is an inverse relationship between the complexity of the task and the optimum level of anxiety. It follows therefore that a really complex task performed in anxiety-arousing conditions could produce results that are linear. There could be a situation like perhaps the one in the present study where the optimum level of anxiety was most closely attained by the low-test-anxious group. In such circumstances the anxiety level of the other groups would tend to be too high and would thus interfere with performance. In this study there was no significant difference between the performances of the moderate- and the high-test-anxious groups and they both did significantly more poorly than the low-test-anxious. It is possible that in such circumstances the relationship could approach linearity.

Correlation and Causation

It is clear that test-anxiety and test-performance are related. What is equally clear is the fact that mere association, though necessary, is not sufficient evidence to infer causality (Minium, 1970). There are, according to Minium, four possibilities.

a) It may be that performance is determined (in part at least) by anxiety or

b) anxiety could be the result of poor performance or

c) both could be caused by a third single factor or

d) both anxiety and performance could be caused by a third factor which is itself a complex set of interrelated factors.

According to Sarason and his colleagues (1960) the crucial questions in the relationship between test-anxiety and test-performance are: Does lack of ability cause test-anxiety or does test-anxiety interfere with intellectual performance? It seems quite plausible that both could be correct. In fact Sarason and his colleagues, who investigated this problem, admit that in any sizeable group of children there should be instances of both types of effect. They put forward however fairly convincing arguments to show why lack of ability is not the dominant factor in the relationship.

If ability (or lack of it) is the cause and anxiety the effect, they argue, then students matched on ability should not vary in performance in any way other than randomly, and definitely should not vary according to their level of anxiety; but results of studies done to test this argument does not support it. In fact the significant differences found coincided with the anxiety levels of the groups in the [illegible]. (Waite et al, 1958; Young & Brown, 1973).

Another argument that is equally convincing is that if lack of ability is the dominant factor then one would expect

that in a group of intellectually-superior students the correlation between anxiety and performance would be negligible. This was disproved by Mandler and Sarason (1952) who worked with a select group of undergraduates at Yale College. Despite the selectivity and homogeneity of the group, the correlation obtained was negative and significant ($r = -.21$).

The evidence cited cannot be considered conclusive but it does suggest that although there are instances when lack of ability causes test-anxiety, it is test anxiety that is the dominant causal factor in the relationship.

If this is true then it should have serious implications for Guyana, for in the Guyanese sample the anxiety level as determined from this study appears to be significantly higher than that for North American and English samples. (Sarason et al, 1960).

Analysis of Variance

The results of the analysis of variance supported those obtained on the Pearson Correlation equation in that it revealed significant differences among the anxiety groups. However, they failed to show any significant main effects due to sex or treatment, nor did they reveal any effects of significance due to the interaction of the main variables.

The failure of the present investigation to find a significant difference in performance due to treatment is

not altogether surprising. In order to avoid the administrative problems that would have resulted from the insertion of answers in the test booklets, the students were obliged to record their answers on specially-prepared IBM answer sheets, something to which they were unaccustomed. It is quite possible therefore that the introduction of this unfamiliar mode of recording their answers served to increase the test-like appearance and the complexity of the task, and consequently, increased the anxiety-arousing stimuli present even in the control condition.

Another factor which might explain the failure to obtain a significant difference is the retention of the word TEST on the booklets used by the Control Group, for as Sarason et al (1960) contend the word "test" is a fairly powerful anxiety-arousing stimulus.

Nevertheless, the analysis did reveal that the difference due to treatment could have occured by chance only about eight times in a hundred and this certainly comes close to the level of significance required in this study.

Another finding of interest to investigators in this field, is the pattern of response by the sample on the anxiety scale. The significant difference in the mean scores between the sexes is consistent with findings reported in similar studies (e.g. Gjesme 1972) and has already been discussed in a preceding chapter.

The other equally interesting point is the performance

of the sample on the anxiety scale as compared to that of American and English samples reported in other studies. (Sarason et al, 1960) The mean anxiety scores obtained on the TASC by samples from the three countries are shown in Table 14.

Table 14

Mean Anxiety Scores by Samples in Three Countries

Country	Boys	Girls	Total
Guyana	16.3	18.5	17.4
U.S.A.	6.5	7.5	7
Britain	9	11	10

The figures certainly convey the impression that Guyanese children are much more test-anxious than their British and American counterparts. However, the differences might not be as substantial as they appear, for the British and American samples were drawn from Grades one to four while the Guyanese sample consisted of seventh-grade pupils This is significant since there are indications that test-anxiety in children increases as they progress through the elementary school (Sarason et al, 1960).

The relatively high scores obtained by the Guyanese sample is not altogether inexplicable. Guyana has in common with China the strict child-rearing practices reported by

Lian-Hwang-Chiu (1971) and Paschal and Kuo (1973). She also shares with Britain a test-oriented, highly selective educational system, and as has been alluded to earlier, restrictive child-rearing practices tend to have an adverse effect on children's attitude towards evaluation.

Limitations of the Study

It is recognized that in studies of this nature, the characteristics of the population from which the sample is drawn and the quality of the testing instruments place certain limitations on the assumptions and generalizations which can be made.

The sample in this study was drawn from the seventh-grade in four urban and rural elementary schools and therefore caution should be exercised if the findings were to be generalized to other sections of the population.

There is also a problem inherent in anxiety scales. Their susceptibility to distortions is generally recognized by researchers in this area (Cronbach, 1970; Nighswander et al, 1970), and has already been discussed in great detail. Awareness of this deficiency in the testing instrument should, however, serve as a reminder to readers of the fallibility of scores obtained on such instruments and of the limits which ought to be placed upon their interpretations.

Implications for Educational Administrators

The most significant finding of this study is the conclusion that there are present in the testing situation certain cues which precipitate anxiety and adversely affect performance especially among high-test-anxious students.

It seems that test-oriented educational systems like that found in Guyana tend to discriminate against the high-test-anxious students. In the author's opinion, it is even possible that there are among these high-test-anxious "failures", some able students whose only weakness is their inability to control their anxieties. Fortunately, the literature suggests a number of strategies which could minimize the test-like characteristics of the examination situation and thus help these high-test-anxious students.

The use of humour has been investigated by various researchers. Illustrative of these studies is the one done by Smith and his associates (1971). They administered two forms of a test (humorous and non-humorous) to a sample divided into low-, moderate- and high-test-anxious. They found that the high-test-anxious students receiving the non-humorous form performed significantly more poorly than did the low- or moderate-test-anxious, and at a significantly lower level than did the high-anxiety group that received the humorous form. This suggests that humour may reduce anxiety and thereby improve performance in high-test-anxious students. This finding is consistent with those obtained

by Dworkin and Efran (1967) and Singer (1968), and supports earlier observations made by Freud (1928) and Byrne (1956).

It has already been suggested that the order of the items might have an effect on the amount of anxiety generated by the test (Towle & Merrill, 1972).. It might help if the the items are arranged in ascending order of difficulty. With this arrangement the early successes on the relatively easy items could bolster the testees' self-confidence and thus lessen their anxieties.

Another factor which is reported to have an influence on the anxiety-level of testees is the personality of the invigilators. Sarason (1973) and Doyal and Forsyth (1973) investigated this aspect of the evaluative process and concluded that the anxious as well as the cool and aloof types of examiner tend to have an adverse effect on the students' performance. This suggests that invigilators be subjected to some form of screening procedure in order that those with pleasant friendly personalities could be identified.

There are those who will argue, and with perhaps some degree of justification, that in the harsh reality of life, the anxiety-prone individual might prove to be more a liability than an asset if put in positions of responsibility, but in a young nation like Guyana, the risk of having an able but anxious person in a position of responsibility must be carefully weighed against the loss of brain power that co

result from the elimination of the high-test-anxious at the examination centres. However, in the final analysis, the long-term aims of the assessment procedures should determine the conditions under which the examinations are administered.

Perhaps the early identification and treatment of the anxious students will be most advantageous not only to the students themselves but to the nation as a whole. Achievement of this will however depend on the quality of the teachers and of the teacher-training programmes to which they are exposed.

Sarason et al (1960) assert that teachers wittingly or unwittingly engender in their classrooms attitudes towards learning, tests, failure and success. In some classrooms failure or slow progress is treated with such harsh methods that the children's feelings of inadequacy and consequently their anxiety levels are increased. In others these same failures are treated with such patience and tact that little or no damage is done to the child's self-esteem.

Responsibility for the training of the type of teacher who is able to recognize this psychological problem and who is then able to adapt her techniques accordingly, must be assumed by the nation's teacher-training institutions.

Implications for Future Research

A number of directions for future research are suggested by the findings of the present study. The present sample

was drawn from the seventh-grade. There is need then for research to be carried out to determine if the conclusions reached in this study are valid for the other grades in the All-age school and for the secondary and post-secondary educational institutions.

In this study, as in most of the reported studies on this topic, the low-test-anxious subjects performed better than their moderate- and high-test-anxious peers. Perhaps some of these studies should be replicated with an achievement instrument of medium difficulty in order to verify the prediction of the theory that the moderate-test-anxious would, on such an instrument, probably produce better performance than either of the other two groups.

Perhaps most importantly, research is needed to explore ways in which the high-test-anxious could be challenged without their anxiety levels exceeding the non-debilitating limits. Sieber (1969) investigated this problem and suggested that the provision of memory support might aid the high-test-anxious to counteract the interfering effects of anxiety. Some of the strategies she recommends are mnemonic devices, diagrams, and notational systems but there is need for these suggestions to be validated by classroon-oriented research.

Summary

The present study explored the relationship between

test-anxiety and test-performance with specific reference to the seventh-grade population in the Guyanese All-age schools.

The findings support the hypothesis that predicts an inverse relationship between the two factors. The significant negative correlation coefficient obtained, was consistent with the theoretical position adopted in the study. In general, the performance of individuals classified as low-test-anxious was significantly superior to those classified as moderate- and high-test-anxious.

The predicted effect of sex and of treatment conditions was not found, hence further research to ascertain the effects of these two variables is recommended.

Perhaps the most serious implication arising out of this study is the realization that in a society like Guyana where examinations occupy a focal position, the deleterious effects of anxiety place at a distinct disadvantage, a significant section of the population.

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APPENDICES

APPENDIX A

Test Anxiety Scale for Children

1. Do you worry when the teacher says that she is going to ask you questions to find out how much you know?

2. Do you worry about being promoted, that is, passing from seventh grade to the eighth grade at the end of the year?

3. When the teacher asks you to get up in front of the class and read aloud, are you afraid that you are going to make some bad mistakes?

4. When the teacher says that she is going to call upon some boys and girls in the class to do arithmetic problems, do you hope that she will call upon someone else and not on you?

5. Do you sometimes dream at night that you are in school and cannot answer the teacher's questions?

6. When the teacher says that she is going to find out how much you have learned, does your heart begin to beat faster?

7. When the teacher is teaching you about arithmetic, do you feel that other children in the class understand her better than you?

8. When you are in bed at night, do you sometimes worry about how you are going to do in class the next day?

9. When the teacher asks you to write on the blackboard in front of the class, does the hand you write with sometimes shake a little?

10. When the teacher is teaching you about reading, do you feel that other children in class understand her better than you?

11. Do you think you worry more about school than other children?

12. When you are at home and you are thinking about your arithmetic lesson for the next day, do you become afraid that you will get the answers wrong when the teacher calls upon you?

13. If you are sick and miss school, do you worry that you will do more poorly in your schoolwork than other children when you return to school?

14. Do you sometimes dream at night that other boys and girls in your class can do things you cannot do?

15. When you are home and you are thinking about your reading lesson for the next day, do you worry that you will do poorly on the lesson?

16. When the teacher says that she is going to find out how much you have learned, do you get a funny feeling in your stomach?

17. If you did very poorly when the teacher called on you, would you probably feel like crying even though you would try not to cry?

18. Do you sometimes dream at night that the teacher is angry because you do not know your lessons?

In the following questions the word "test" is used. What I mean by "test" is any time the teacher asks you to do something to find out how much you know or how much you have learned. It could be by your writing on paper, or by your speaking aloud, or by your writing on the blackboard. Do you understand what I mean by "test" --it is any time the teacher asks you to do something to find out how much you know.

19. Are you afraid of [illegible] tests?

20. Do you worry a lot [illegible] you take a test?

21. Do you worry a lot while you are taking a test?

22. After you have taken a test do you worry about how well you did on the test?

23. Do you sometimes dream at night that you did poorly on a test you had in school that day?

24. When you are taking a test, does the hand you write with shake a little?

25. When the teacher says that she is going to give the class a test, do you become afraid that you will do poorly?

26. When you are taking a hard test, do you forget some things you knew very well before you started taking the test?

27. Do you wish a lot of times that you didn't worry so much about tests?

28. When the teacher says that she is going to give the class a test, do you get a nervous or funny feeling?

29. While you are taking a test do you usually think you are doing poorly?

30. While you are on your way to school, do you sometimes worry that the teacher may give the class a test?

APPENDIX B

Instructions for the Administration of the TASC

Good morning everyone. I'm going to be asking you some questions--questions different from the usual school questions for these are about how you feel and so have no right or wrong answers. First I'll hand out the answer sheets and then I'll tell you more about the questions....

Write your name at the top of the first page, both your first and your last names....Also write a B if you're a boy or a G if you're a girl. (For the fourth, fifth, and sixth grades, "Write the name of the school you attended last year and year before last.")

As I said before, I am going to ask you some questions. No one here will see your answers to these questions, not your teacher or your principal or your parents. These questions are different from other questions that you are asked in school. These questions are different because there are no right or wrong answers. You are to listen to each question and then put a circle around either "yes" or "no". These questions are about how you think and feel and, therefore, they have no right or wrong answers. People think and feel differently. The person sitting next to you might put a circle around "yes" and you may put a circle around "no". For example, if I asked you this question: "Do you like to play ball?" some of you would put a circle around "yes" and

some of you would put [redacted] around "no". Your answer depends on how you think and feel. These questions are about how you think and feel about school, and about a lot of other things. Remember, listen carefully to each question and answer it "yes" or "no" by deciding how you think and feel. If you don't understand a question, ask me about it.

Now let's start everybody putting their finger on Number 1. Here is the first question. Number 1. "Do you worry when -----? (Repeat this procedure of introducing the questions for several of them and continue throughout to say the number of the question before reading it.)

APPENDIX C

Specimen Answer Sheet (Anxiety Scale)

Name ..... Sex .....

School ..... Date .....

1.	YES	NO
2.	YES	NO
3.	YES	NO
4.	YES	NO
5.	YES	NO
6.	YES	NO
7.	YES	NO
8.	YES	NO
9.	YES	NO
10.	YES	NO
11.	YES	NO
12.	YES	NO
13.	YES	NO
14.	YES	NO
15.	YES	NO
16.	YES	NO
17.	YES	NO
18.	YES	NO
19.	YES	NO
20.	YES	NO
21.	YES	NO

21. A girl spent $\frac{1}{8}$ of her money for car-fare, and three times as much for clothes. Half of what she had left was 80 cents. How much money did she have at first?

(A) $1.60
(B) $2.40
(C) $3.20
(D) $6.40

---

22. Joan had to wait 45 minutes for the 12:10 bus. At what time did she arrive at the terminus?

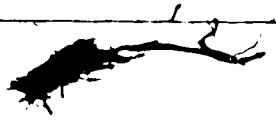
(A) 11:05 a.m.
(B) 11:25 a.m.
(C) 11:30 a.m.
(D) 11:50 a.m.

---

23. Which of these signs indicates the shortest distance?

(A) "Toil Station - 100 yards"
(B) "Picnic Area - 400 feet"
(C) "Half-way Inn - 0.3 mile"
(D) "Dangerous Turn - $\frac{1}{2}$ mile"

22.	YES	NO
23.	YES	NO
24.	YES	NO
[illegible]	YES	NO
[illegible]	YES	NO
[illegible]	YES	NO
[illegible]	YES	NO
[illegible]	YES	NO
[illegible]	YES	NO



APPENDIX D

NUMBER .....

M A T H E M A T I C S T E S T

Time: 50 mins

INSTRUCTIONS

1. This test contains 50 questions.

2. Show the correct answer by placing a mark between the guide-lines on the answer sheet that have the same number as the question in the test booklet.

   Use pencils only.

   Here is an example done for you.

   What is the sum of 3, 4, and 5?

   (A) 9

   (B) 10

   (C) 11

   (D) 12

   Answer Sheet A 1 B 2 C 3 D 4 E 5

   Notice that the space under D is shaded because 12 the correct answer is near to (D).
   REMEMBER: Mark only one answer to each question.

3. If you want to change your answer make sure that the first mark you made for that question is COMPLETELY erased.

4. You may work mentally but if you need to do rough-work, use the blank sheet provided.

   DO NOT WRITE IN THE TEST BOOKLETS.

1. How would you write the numeral one million one hundred and ten?

(A) 1,110

(B) 1,100,010

(C) 1,100,100

(D) 1,110,000

---

2. Which is another name for 5 hundreds plus 9 tens plus 13 singles?

(A) 5913

(B) 5103

(C) 603

(D) 593

---

3. How would you write 9 hundredths as a decimal?

(A) 900

(B) 0.9

(C) 0.09

(D) 0.009

4. What number is 102 times as big as 315?

(A) 945

(B) 3780

(C) 9450

(D) 32130

---

5. In which of these numbers does the numeral 3 represent 3 hundred thousand?

(A) 3192684

(B) 1368572

(C) 943027

(D) 537105

---

6. Eric's answer to an addition example was 4937. The 9 should have been 8. How much too large was his answer?

(A) 1000

(B) 100

(C) 10

(D) 1

7. What is the total number of 11-man teams that can be put together from eleven 9-man teams?

(A) 9

(B) 11

(C) 12

(D) 16

---

8. When 196 is subtracted from a certain number the answer is 54. What is the number?

(A) 250

(B) 240

(C) 142

(D) 132

---

9. With which of these divisors could you have a remainder of 5?

(A) 3

(B) 4

(C) 5

(D) 6

10. How many times can 0.15 be taken away from 60?

(A) 4

(B) 40

(C) 59.85

(D) 400

---

11. In the exercise below why is the figure 8 in the number 1284 placed under the figure 2 in the number 6420?

$$\begin{array}{r} 321 \\ \times 24 \\ \hline 6420 \\ 1284 \\ \hline 7704 \end{array}$$

(A) Because Mathematics books do it that way.

(B) So that the 1 will be under the 6.

(C) Because 2 and 8 both mean ten.

(D) Because it looks neater that way.

12. The number 79 is equal to ---- .

(A) $7 \times 10 + 9 \times 10$

(B) $7 \times 1 + 9 \times 10$

(C) $7 \times 10 + 9 \times 1$

(D) $7 \times 1 + 9 \times 1$

13. Which expression has a value of zero?

(A) $6 + 8 \times 0$

(B) $16 - 8 \times 2$

(C) $\frac{3 + 0}{5 + 6}$

(D) $\frac{7}{5} - \frac{2}{5}$

14. What must be multiplied by 7 to give 3 as the answer?

(A) 21

(B) 4

(C) $\frac{7}{3}$

(D) $\frac{3}{7}$

15. In which of these sets of fractions is $\frac{1}{5}$ the largest?

(A) $\frac{1}{8}$ $\frac{1}{5}$ $\frac{1}{3}$

(B) $\frac{1}{3}$ $\frac{1}{6}$ $\frac{1}{8}$

(C) $\frac{1}{4}$ $\frac{1}{5}$ $\frac{1}{6}$

(D) $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{5}$

---

16. Note books are sold at 2 for 25¢. Colin bought 10 of them and paid with a five-dollar note. Which of these represents his change?

(A) \$1.00 + \$1.00 + 50¢

(B) \$1.00 + \$1.00 + 25¢ + 10¢ + 5¢

(C) \$1.00 + \$1.00 + \$1.00 + 50¢

(D) \$1.00 + \$1.00 + \$1.00 + 50¢ + 25¢

---

17. How many one-inch cubes can a tray 3 inches wide, 2 inches deep and 12 inches long hold?

(A) 72

(B) 36

(C) 24

(D) 17

18. What is another way of writing 15 minutes before mid-night?

(A) 12:15 a.m.

(B) 12:15 p.m.

(C) 11:45 a.m.

(D) 11:45 p.m.

---

19. How many children can each get a slice of pizza if there are 8 pizzas and 3 children?

(A) 6

(B) 12

(C) 24

(D) 36

---

20. A man spent $\frac{2}{3}$ of his money and had $18.00 left. How much had he at first?

(A) $12.00

(B) $27.00

(C) $36.00

(D) $54.00

24. When Sam has grown another $5\frac{1}{2}$ inches, he will be 5 ft 2 in. How tall is he now?

(A) 4 ft $8\frac{1}{2}$ in

(B) 4 ft $9\frac{1}{2}$ in

(C) 5 ft $7\frac{1}{2}$ in

(D) 5 ft $8\frac{1}{2}$ in

---

25. How many centimetres are there in 1 metre plus 2 decimetres?

(A) 1200

(B) 120

(C) 102

(D) 12

---

26. Which one of these examples will give the greatest answer?

(A) $\frac{1}{8} \times \frac{1}{8}$

(B) $\frac{1}{8} \div \frac{1}{8}$

(C) $\frac{1}{8} + \frac{1}{8}$

(D) $\frac{1}{8} - \frac{1}{8}$

Sharon estimated the answer for each of these examples by first rounding the numbers to the nearest ten and then multiplying. For which example did she multiply 30 x 50 ?

(A) 28 x 51

(B) 27 x 44

(C) 24 x 53

(D) 32 x 56

---

28. The boys ate 4 mangoes each. To find how many mangoes they ate altogether, you need to know how -----.

(A) large the mangoes were

(B) many boys ate more than 4 mangoes

(C) many mangoes were left

(D) many boys were there

---

29. In a cricket series Rowe scored 100, 66, 0 and 74. What was his average score?

(A) 240

(B) 80

(C) 66

(D) 60

30. Which of these is the best estimate of the average for the numbers 3, 5, and 9?

(A) A number smaller than 3

(B) A number larger than 9

(C) A number between 3 and 9

(D) The sum of the numbers

---

31. A boy had twice as many problems right as wrong. If he had done 36 problems, how many were right?

(A) 12

(B) 18

(C) 24

(D) 72

---

32. If 8 pupils represent 32% of a class, what is the total number of pupils in the class?

(A) 16

(B) 20

(C) 25

(D) 64

33. Twelve of the 36 pupils in a class are 8-year-old girls; all other pupils are 10-year-olds. If there are 17 boys, how many 10-year-old girls are there?

(A) 7
(B) 12
(C) 19
(D) 24

---

34. A square field will contain 81 sq yd if each side is 3 yd longer. How long is a side of the field now?

(A) 3 yd
(B) 6 yd
(C) 9 yd
(D) 27 yd

---

35. The area of a 20 yard-long retangular plot is 180 sq yd. What is the length of <u>one</u> of the shorter sides.

(A) 9 yd
(B) 70 yd
(C) 80 yd
(D) It is impossible to tell.

36. An empty truck weighs $2\frac{1}{2}$ tons. How many 56-lb bags can it safely carry across a bridge that was built to take a weight of 5 tons?

(A) 50

(B) 100

(C) 140

(D) 200

---

37. A vendor lost 35 cents when he sold a quantity of milk for $4.25. What did it cost him?

(A) $4.60

(B) $4.50

(C) $3.90

(D) $3.80

---

38. A school of 250 students has 24 more girls than boys. How many pupils were boys?

(A) 113

(B) 118

(C) 137

(D) 226

39. Ann has 50 cents. No one else in her class has 50 cents. This means that -----.

(A) no other child in the class has money

(B) the other children have more than 50 cents

(C) the other children have spent their money

(D) only one child in the class has exactly 50 cents

---

40. Every $\frac{1}{2}$ inch on a certain map represents 40 miles. A road is shown by a line $3\frac{1}{2}$ inches long. What is the actual length of the road.

(A) $1\frac{3}{4}$ miles

(B) $3\frac{1}{2}$ miles

(C) 140 miles

(D) 280 miles

---

41. A jug when full of water weighed 24 pounds and when half-full weighed 14 pounds. What was the weight of the jug?

(A) 4

(B) 5

(C) 10

(D) It is impossible to tell.

42. Jim and Denis started playing with 50 buttons each. Jim lost 12 to Denis. How many more buttons has Denis than Jim?

(A) 12

(B) 24

(C) 38

(D) 62

---

43. The average weight of Elton and Kevin is 76 pounds. If Kevin were 10 pounds lighter what would have been their average weight?

(A) 33

(B) 66

(C) 71

(D) 81

---

44. In a factory 2 machines and 5 men can work as quickly as 18 men with no machines. How many men can 10 of these machines replace?

(A) 180

(B) 90

(C) 65

(D) 25

45. A plot is 120 yards long and 84 yards wide. How many men will be needed to weed it in 2 days if each man does 210 sq yd per day?

(A) 24

(B) 48

(C) 96

(D) 105

---

46. Mark is 2 years younger than Janet but is twice as old as June. If Janet is 16 years old, what is June's age?

(A) 14

(B) 9

(C) 8

(D) 7

---

47. Emil and Frank together weigh 159 pounds. Harry and Emil together weigh 163 pounds. If the total weight of the three of them is 238 pounds, what is Emil's weight?

(A) 75 pounds

(B) 79 pounds

(C) 84 pounds

(D) none of these

48. A bridge which is 35 yards long is built across a stream so that 6 feet of it will rest on one bank and 9 feet on the other. How wide is the stream in yards?

(A) 35

(B) 33

(C) 30

(D) 20

---

49. One-fourth of John's money is equal to one-half of Harry's. If Harry has 24 cents, how much has John?

(A) 96¢

(B) 48¢

(C) 12¢

(D) 6¢

---

50. After selling his coconuts at 11¢ each a vendor remarked, "If I sold them at 2 for 25¢ I would have made $1.50 more." How many coconuts did he sell?

(A) 100

(B) 150

(C) 300

(D) 1875

APPENDIX E

Instructions for the Administration of the Achievement Test

Anxiety-Arousing Instructions

1. Today you are going to do a test in Mathematics. As you see there are children from another school so it is important that you do your best for your school. The test is very difficult so some of you will not get many right. Now be sure to listen carefully to the directions so you won't get mixed up. I will put the booklets on your desks. Do not turn them over until you are told to do so. Check your booklet to see if it contains 50 questions. Let us read the instructions on the front cover. You read silently while I read aloud. (See appendix D for instructions)

2. There are four important things to remember.

   i) Make a heavy mark. Do not spend too much time trying to be very neat; but make sure that the mark is very black.

   ii) Make certain that you place your mark in the row numbered the same as the item in the booklet.

   iii) Make only one mark in a row.

   iv) Do not fold or bend your answer sheets.

You have 50 minutes to do this test. The time is now ----. I shall write on the blackboard when half of the time is finished and when there are ten minutes left. You may begin.

Anxiety-Allaying Instructions

Today we are going to do some work similar to the type we have been doing in class. The results will be used by a Guyanese student in a University in Canada. He is investigating the problems faced by children during examinations.

There is nothing to be worried about, just try to do the best you can. I will put the booklets on the desk and as soon as everyone has a booklet I will go over the instructions with you.

Let us read the instructions on the front cover. You read silently while I read aloud. (See appendix D for instructions)

The remaining instructions were the same as those under 2 for the Experimental group.

VITA

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Government Training College for Teachers
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1964 - 1970 B.A. (History)

University of Alberta
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