CHAPTER VII

SUMMARY AND CONCLUSIONS

Anxiety research has become a dominant topic in psychology, education and related disciplines. This area of research concerning the influence of anxiety on human learning and performance has significance for psychological theory as well as educational practice.

The conceptual distinction between state anxiety (A-State) and trait anxiety (A-Trait) was suggested more than two decades ago by Cattell and Scheier (1961). Over the past two decades, this distinction has been clarified and operationalized by Spielberger (1966, 1972a, 1972b), and has proved useful in stimulating research on stress and anxiety, as well as in reducing the semantic confusion since much of the confusion in the anxiety literature has resulted from the failure to distinguish between state anxiety (A-State) and trait anxiety (A-Trait). According to Spielberger (1966, 1972a, 1972b, 1975), A-Trait refers to relatively stable individual differences in anxiety proneness, i.e., to differences in disposition to respond to situations perceived as threatening with elevations in the intensity of A-State. State anxiety (A-State) is defined as a transitory emotional state that varies in intensity, fluctuates over time, and is characterized by feelings of tension and apprehension and by heightened
activity of the autonomic nervous system. A major
collection of Trait-State Anxiety theory is that it
has helped to clarify the relationship between type of
threat (physical or psychological) and elevations in
A-State for persons who differ in A-Trait. These two
kinds of stressors have differential pattern of evoking
A-State reactions among the individuals differing in
A-Trait. Fear of failure is a major characteristic of
The findings of a number of Western studies have been
generally consistent with the assumptions of Trait-State
Anxiety theory that situations characterized by physical
danger usually do not pose any threat to self-esteem and,
therefore, do not produce differential A-State elevations
for individuals who differ in A-Trait. But situations that
involve threat to self-esteem produce higher A-State
elevation for subjects with high A-Trait than in persons
low in A-Trait (e.g., Hodges, 1968; Hodges & Spielberger,
1966, 1969; Spielberger et al., 1972; Lamb, 1973; Glover &
Cravens, 1974; Kondell et al., 1976; Carlile, 1977; Wankal,
1977; Thompson, 1977; Joesting & White, 1977; Glanzmann
& Laux, 1978; Lazarus & Launier, 1978; Grinnell & Kyte,
In two studies conducted in Indian setting one supported
the above findings (Sharma, 1976) while the another did not (Gupta, 1983).
In fact, neither the predictions of Trait-State Anxiety theory have been sufficiently and systematically tested nor A-State scores have been considered either as dependent or independent variables in Indian studies. The emphasis on these distinctions in anxiety research is both useful and necessary as a number of studies have shown that A-State predicts performance better than A-Trait (Hodges & Spielberger, 1966; Meyers & Martin, 1974; Okameto, 1977; Ravinder, 1977; Reeves & May, 1977; Moreno, 1978).

There is also growing evidence that anxiety is a factor of considerable importance in influencing test performance (Gaudry & Spielberger, 1971; Sharma, 1978a, 1978b). In research on the relationship between anxiety and performance, response competition theory (Spence & Spence, 1966) and its extension to include individual differences in intelligence (Gaudry & Spielberger, 1971) and test anxiety theory (a situational-specific trait anxiety) developed by Sarason (1972a, 1978), have attracted greater amount of attention in India (e.g., Nijhawan, 1972; Gakhar et al., 1973; Gakhar & Luthra, 1974; Nagpal & Sen, 1976; Sharma & Wangu, 1976; Srivastava, 1977; Ravinder, 1977; Sharma, 1976; Sharma & Rao, 1983a, 1983b, 1984; and Sud, 1984). Such studies have been concerned with the effects of differential levels of anxiety on performance in a variety of learning situations (see also, Floeg et al., 1984, 1985). Much of the available evidence, based on
bivariate research, supports the contention that high anxiety persons perform most tasks less successfully than their low anxiety counterparts in a variety of learning contexts (e.g., Nottelmann & Hill, 1977; Deffenbacher, 1978, 1980; Ploeg, 1979; Boor, 1980; Sieber, 1980; Morris & Engle, 1981; Morris et al., 1981; Wine, 1982; Deffenbacher & Hazaleus, 1985; Nijhawan, 1972; Sharma & Wangu, 1976; Deshpande, 1978; Gupta & Gupta, 1980; Upmanyu et al., 1980; Contractor, 1981; Sharma & Sud, 1982).


While the findings on anxiety-performance relationship have not always been consistent with Drive theory, these studies have highlighted that the complexity or difficulty of the task to be learnt, and type or level of stress (usually ego-stress) are two factors in particular
which must be considered in explaining the influence of anxiety on performance. It is under conditions of ego-stress only that high anxiety has typically been found to interfere with performance (Gaudry & Spielberger, 1971; Sarason, 1972a, Glover & Cravens, 1974; Heuser, 1978; Deffenbacher, 1978; Dych et al., 1979; Zarantonello et al., 1979; Morris et al., 1981; Tayler & Tayler, 1982). In fact high anxiety subjects under ego-stress perform less well than their counterparts under reassuring instructions (see also, Nijhawan & Cheema, 1972; Ravinder, 1977; Thakur, 1978; Sharma & Sud, 1982).

Spielberger (1966, 1972) also provided an extension of Drive theory to incorporate individual differences in intelligence, and thus, took into account the variables such as difficulty of the learning tasks, stages of learning and types of performance measures (see also, Gaudry & Spielberger, 1971). The primary hypothesis from which this extension proceeds is that the difficulty of learning task will depend upon the intelligence level of the subjects. He has provided different predictions for tasks on varying difficulty level. Evidence supporting this extension of Drive theory is scarce because of traditional reluctance of experimental psychologists to come to grips with the individual differences. However, there is a strong possibility that relationship between anxiety and learning may be obscured by anxiety X intelligence.
interaction (Denny, 1966; Spielberger & Smith, 1966; Kanekar, 1977; Jaswinder, 1980; Sharma, Dang & Spielberger, 1985). This is because task difficulty/complexity is an important factor in the study of anxiety and learning and task difficulty/complexity is dependent upon the IQ of the learner. In fact, task difficulty needs to be either controlled or systematically varied. There are some studies by Katahn et al. (1971), Stutler (1973), and Bejtelsmit (1978) that do not lend support to Spielberger's extension of Drive theory. There is also some evidence that anxiety disturbs performance on difficult tasks and facilitates performance on easy tasks (see also, Bermuder, 1978).

In some studies conducted in West, trait anxiety, kinds of stressors and task difficulty have been considered together to see their single or joint effects on state anxiety and performance (e.g., Glanzmann & Laux, 1978). However, intelligence as an independent variable has been generally ignored in Indian studies that have dealt with anxiety-performance relationship.

In the present investigation, Spielberger's (1966, 1972a, 1972b, 1975) formulation of Trait-State Anxiety theory and also his extension of Drive theory to incorporate individual differences in intelligence (Spielberger, 1966, 1972a, 1972b) were empirically tested. Specifically the study aimed at the following objectives:
Objectives

1) To empirically test prediction of Spielberger's (1966, 1972a, 1972b, 1975) Trait-State Anxiety theory under conditions of ego-threat as contrasted with the conditions of reassurance on high school boys and girls of Himachal Pradesh. Additionally, the study has been directed towards testing the generalizability of this theory to the high school boys and girls who differ in their cognitive capacity (intelligence).

ii) To empirically test the predictions of Spielberger's (1966, 1972a, 1972b) extension of Drive theory to include individual differences in intelligence. Specifically, the possible interactive effects of trait anxiety, intelligence and stressor conditions have been investigated on three learning tasks of moderate difficulty (paired-associates, problem solving and anagrams).

Two separate studies were carried out to attain these two objectives in order to investigate the effects of trait anxiety, psychological stress and intelligence on state anxiety and performance on a sample of high school boys and girls studying in Himachal Pradesh and Panjab.

Study I

Hypothesis

A) Performance: Paired-Associates Learning Task of Moderate Difficulty

Under ego-stress instructions, high trait anxiety (HA) will facilitate the performance of the high intelligent
(HI) and impair the performance of the low intelligent (LI) high school girls relative to their low trait anxiety (LA) counterparts.

**Design and Sample**

A factorial between group design (2x2x2) was employed with two levels each of A-Trait (high and low), intelligence (high and low) two stressor conditions (ego-stress and reassuring instructions). The high and low levels on different independent variables were determined on the basis of their means and standard deviations. There were 15 subjects in each cell. The dependent variables were: i) total number of trials to the learning criterion; and ii) total number of errors to the learning criterion.

515 girls studying in the 9th class were randomly selected from the different schools of Jalandhar city. Firstly, small groups of these students were administered the 'GMAT' (Singh, 1967) and A-Trait scale of the STAI (Spielberger et al., 1973) under standard instructions.

120 girls for the final sample were selected on the basis of their scores on anxiety (A-Trait) and intelligence tests. High and low groups were formed by selecting the subjects that scored above and below 'M±1SD' on both the tests, i.e., for trait anxiety and intelligence.
Thus, four experimental groups were formed, i.e., HA-HI, HA-LI, LA-HI and LA-LI. These four groups comprising 30 subjects each were selected in such a manner that:

i) high and low anxiety groups had similar distribution on intelligence scores; and

ii) the high and low intelligent groups had similar distribution on the STAI A-Trait. Further, each of these four groups was randomly divided into equivalent groups of 15 subjects, with each subject to be randomly assigned to the stressor conditions, i.e., ego-stress and reassuring instructions.

Tools

Following tools and learning tasks were employed to collect data for the present Study I:

i) Hindi version of the A-Trait scale of the State-Trait Anxiety Inventory (Spielberger et al., 1973).

ii) Hindi version of the Hundal's General Mental Ability Test (Singh, 1967).

iii) Paired-Associates Learning Task of Moderate Difficulty

Two different tasks of paired-associates in Hindi (adjectives) were used, a practice list and an experimental list, following the lists of adjectives used and the procedure employed by Verma and Nijhawan (1972). In order to assess the associative strength of different response words to seventy adjectives and to prepare moderately
difficult lists of paired-associates, a list of 70 Hindi adjectives was presented verbally and individually to each of the 395 high school girls who were left out of the main experiment on the basis of their intelligence scores, since these were neither categorized as high nor low intelligent. The adjectives having 50% association values and above were taken as easy words and those having association values between 25% and 45% were considered as with moderate difficulty. The final list comprises of 12 pairs.

Procedure

After the presentation of the practice list and the administration of either ego-stress (see Spielberger & Smith, 1966; Sharma & Wangu, 1976; Ravinder, 1977; and Glanzmann & Laux, 1978) or reassuring instructions to the paired-associates learning task of 12 pairs was presented to all the subjects individually with the help of memory drum under standard paired-associates learning instructions. Exposure time of memory drum for each presentation was adjusted at two seconds. All the pairs were exposed until the subjects reached the criterion of two successive errorless trials or twenty trials at the maximum.

Statistical Analysis

Two separate (2x2x2) Analyses of Variance (ANOVA) were carried out to study the main and interactive effects
of trait anxiety, intelligence and stressor conditions on performance on paired-associates learning task (Edwards, 1968). The post-hoc comparisons were made with the help of t-test.

Findings

The main findings are as under:

i) Regardless of intelligence and stressor conditions high and low anxiety school girls do not differ significantly in their performance.

ii) Irrespective of trait anxiety and stressor conditions, high intelligent school girls perform significantly at higher level than their low intelligent counterparts.

iii) Under reassuring instructions school girls perform better than those under ego-stress instructions. However, this is irrespective of their anxiety levels and stressor conditions under which they learn.

However, all these findings based on bivariate comparisons are restrictive in meaningfulness since a significant triple interaction of all these three independent variables emerged as outlined in (iv).

iv) The most important finding is reflected in significant A-Trait X intelligence X stress interaction.
Specifically this means:

a) Under ego-stress instructions, high anxiety-high intelligent students perform poorly as compared to their low anxiety-high intelligent counterparts. However, low intelligent students perform poorly regardless of their anxiety levels. This signifies that the debilitating effects of high anxiety and ego-stress are nested at the high intelligent level only. The latter conclusion contradicts Spielberger's (1966, 1972a, 1972b) formulation for the tasks of moderate difficulty.

b) Under reassuring instructions, the debilitating effect of high anxiety on performance of high anxiety-high intelligent students is obliterated. Furthermore, reassurance is detrimental to the performance of low anxiety students with either low or high intelligence.

**Study II**

**Hypotheses**

**B) State Anxiety**

Regardless of intelligence level, high school boys and girls with high trait anxiety (HA) will experience greater state anxiety than their low trait anxiety counterparts under ego-stress instructions and not under reassuring instructions.
C) Performance Tasks: Problem Solving and Anagrams Tasks with Moderate Difficulty

Under ego-stress instructions, high trait anxiety (HA) will facilitate the performance of the high intelligent (HI) and impair the performance of the low intelligent (LI) high school boys as well as girls relative to their low trait anxiety (LA) counterparts.

Design and Sample

A factorial between groups design (2x2x2x2) was employed with two levels each of A-Trait (high and low), intelligence (high and low), two-stressor conditions (ego-stress and reassuring instructions) and gender (boys and girls). The high and low levels on these independent variables, except that for gender, were determined on the basis of means and standard deviations on anxiety and intelligence measures. There were 15 students in each cell. The dependent variables were state anxiety and performance on anagrams and problem solving tasks of moderate difficulty.

600 boys and 600 girls studying in the 9th class were randomly selected from the different schools of the towns of Himachal Pradesh. Firstly, small groups were administered under standard instructions the 'GMAT' (Singh, 1967) and A-Trait scale of the Hindi STAI (Spielberger et al., 1973).
240 subjects (120 boys and 120 girls) for the final sample were selected on the basis of their scores on anxiety (A-Trait) and intelligence tests. High and low groups were formed by taking the subjects scoring above and below \( M \pm 1SD \) on both tests, i.e., for anxiety and intelligence, separately for both boys and girls. Thus, four experimental groups, i.e., HA-HI, HA-LI, LA-HI and LA-LI of boys \((N = 120; \ 30 \text{ in each group})\) and girls \((N = 120; \ 30 \text{ in each group})\) each were formed.

These groups were selected in such a manner that: i) high and low anxiety groups had similar distribution on intelligence scores; and ii) the high and low intelligent groups had similar distribution on the STAI A-Trait scale. Further, each of these eight groups was randomly divided into ego-stress and reassuring instructions.

**Tools**

Following tools and learning tasks of moderate difficulty were utilized to collect data for the present Study II:

i) Hindi version of A-State and A-Trait scales of the State-Trait Anxiety Inventory (Spielberger et al., 1973)

ii) Hindi version of Hundal's General Mental Ability Test (Singh, 1967).

iii) Anagrams List of Moderate Difficulty:

100 anagrams were constructed after reading Hindi
course books of 9th and 10th class children. In each anagram five to seven alphabets were used including the 'Matras'. After selecting the target sample for the main study, 20 high and 20 low intelligent subjects were taken from the 1200 students. In order to establish difficulty level of anagrams, subjects were asked to solve these anagrams in 60 minutes having 35 seconds for solving each anagram. The anagrams which were successfully completed by 50% of all the students were termed as of moderate difficulty by 15 anagrams that constituted the final task included eight anagrams of moderate difficulty for the high intelligent and seven anagrams of moderate difficulty for low intelligent subjects. These 15 anagrams were to be completed within 10 minutes, with approximately 35 seconds for each anagram.

iv) Maier & Janzen's (1969) Prisoners' Problem:

The problem consists of a square divided into six cells and is designed as of moderate difficulty which requires a perception that is often overlooked.

Procedure

All the 120 boys and 120 girls who participated in the experiment were administered A-State scale of Hindi STAI before administrating either ego-stress (see Spielberger & Smith, 1966; Sharma & Wangu, 1976; Ravinder, 1977; and Glanzmann & Laux, 1978) or reassuring instructions, as per requirement of the experimental design. The A-State scale
of STAI was again administered after either of the two stressor conditions have been administered. Prior to the presentation of the list of 15 anagrams a practice list of five anagrams was also given to the subjects in order to make them familiar with the task. Both the learning tasks (anagrams and problem solving) were administered in a counter-balancing order, one after another. This means that half the subjects were given anagrams first and the others were given problem solving task first.

**Statistical Analyses**

**State Anxiety**

The changes on repeated measures of the state anxiety (A-State) were analysed separately for boys and girls by Analyses of Co-variance with post A-State scores covaried against pre A-State scores as recommended by Cronbach and Furby (1970). Subsequent ANOVA (2x2x2x2) has been performed on adjusted A-State scores of the high school boys and girls.

**Performance**

Two separate (2x2x2x2) Analyses of Variance were performed for studying the main effects of trait-anxiety (high and low), intelligence (high and low), two stressor conditions (ego-stress and reassuring instructions) and gender (boys and girls) and also their interactive effects
on the performance of high school boys and girls on anagrams and problem solving tasks.

Findings

A) State Anxiety

i) Regardless of intelligence, stressor conditions and gender, high school students with high $A$-Trait experience significantly higher state anxiety as compared to their low $A$-Trait counterparts.

ii) Irrespective of trait anxiety, stressor conditions or gender, boys and girls with low intelligence report significantly greater state anxiety as compared to their high intelligent counterparts.

iii) Under ego-stress instructions, boys and girls experience significantly higher state anxiety as compared to their counterparts who are exposed to reassuring instructions. This is, however, regardless of their anxiety or intelligence levels.

iv) Irrespective of trait anxiety, intelligence and stressor conditions, school boys experience significantly higher state anxiety as compared to their girls counterparts.

However, the above cited findings are based on bivariate comparisons disregarding the effects of other independent variables. Consequently, these have little significance.
v) The findings of significance is reflected in significant A-Trait X intelligence X stress X gender interaction. Specifically this means that:

a) Under ego-stress high school boys and girls with high trait anxiety with either high or low intelligence, experience greater state anxiety than their low trait anxiety counterparts. Further, boys report greater state anxiety than girls at both high as well as low anxiety and intelligence levels under this pre-experimental instruction.

b) The significant gender differences in state anxiety (high and low trait anxiety boys being higher than their girl counterparts) as observed with ego-stress are obliterated with reassuring instructions, given to the students of high intelligence. However, with students of low intelligence, girls with high anxiety report higher state anxiety than their boy counterparts. In other words, reassurance given to the students of low intelligence reverses the direction of gender differences in state anxiety.

c) The differential arousal of state anxiety (higher state anxiety for higher trait anxiety groups) has not only been observed under ego-stress instructions but also under reassuring instructions. However, the levels of state anxiety under reassurance are much lower than those observed under ego-stress for different comparable groups.
It has been concluded that the predictions of Trait-State Anxiety theory, is so far as they relate to the ego-threat condition, have been found to be valid on groups of high school boys and girls in Himachal Pradesh. Further, these predictions also hold good on these school groups with either high or low intelligence.

B) Performance: Anagrams and Problem Solving Tasks of Moderate Difficulty

i) Regardless of intelligence, stressor conditions or gender high and low trait anxiety high school students do not differ significantly on their performance on learning tasks.

ii) Irrespective of A-Trait and stressor conditions high intelligent school boys and girls perform significantly better at higher levels than their low intelligent counterparts.

iii) Under reassuring instructions high school boys and girls perform better than those under ego-stress instructions. However, it is regardless of their anxiety and intelligence levels.

All these findings, based on bivariate comparisons, are restrictive in meaningfulness since significant triple interaction of all these three independent variables emerged as outlined in (iv).

iv) The most important findings are reflected in
significant A-Trait X intelligence X stress interaction effect on the performance of the students on problem solving and anagrams tasks. Specifically this means:

a) Under ego-stress instructions, high anxiety-high intelligent students perform poorly as compared to their low anxiety-high intelligent counterparts. However, low intelligent students performed poorly regardless of their anxiety levels. This signifies that the debilitating effects of high anxiety and ego-stress are nested at the high intelligent level only. The latter conclusion contradicts Spielberger's (1966, 1972) formulation for the tasks of moderate difficulty.

b) Under reassuring instructions, the debilitating effect of high anxiety on performance of high anxiety-high intelligent students is obliterated. Furthermore, reassurance is detrimental to the performance of low anxiety students with either low or high intelligent level in case of problem solving as well as anagrams tasks of moderate difficulty.

It has been concluded on the basis of Study I and Study II that the predictions of Spielberger's (1966, 1972) Drive theory to incorporate individual differences in intelligence has not been upheld in the case of high school boys and girls in India in terms of anxiety-performance relationship studied with three learning tasks
of moderate difficulty (paired-associates, problem solving and anagrams). It has been pointed out that the evidence supporting this theory is scarce because of traditional reluctance of experimental psychologists to come to grips with the individual differences.

The possible interpretation of the observed findings have been provided, the need for multivariate approach to anxiety-performance relationship has been emphasized, and the importance of testing this theory on different samples (including the disadvantaged) as well as with different learning tasks has been underscored. Suggestions for further research has been put forth and the need for cross-cultural validation of such Western theories has been stressed.