CHAPTER III
REVIEW OF THE RELATED LITERATURE

This chapter first deals with the studies in which state anxiety has been considered as dependent variable. This is followed by a review of the studies in which performance on different learning tasks has been investigated as a function of trait (general) anxiety, psychological stress and intelligence, taken singly or jointly. However, the main focus in this review is on paired-associates learning and problem solving including anagrams learning. Only a brief outline has been provided with respect to the other learning tasks. Most of these studies have been conducted within the theoretical framework of Drive theory or its various extensions (Gaudry & Spielberger, 1971). Lastly an overview of the research findings has been attempted in the backdrop of which the hypotheses of the present study have been formulated.

3-1 EFFECTS OF TRAIT ANXIETY AND STRESS ON STATE ANXIETY

The major postulates of Spielberger's theory (1972) are: i) high A-Trait individuals will perceive situations or circumstances that involve failure or threat to self-esteem as more threatening than will persons who are low in A-Trait; ii) physical-threat does not bring about this differential reaction in high and low
A-Trait individuals. The earlier support to these contentions was provided by a number of western studies (Hodges & Spielberger, 1966; Lushene, 1971; Hodges & Felling, 1970; Auerbach, 1972, 1973; Lamb, 1973; Spielberger, Auerbach, Wadsworth, Dunn & Taulbee, 1973; Kendell et al., 1976; Glanzmann & Laux, 1978; Sharma, 1976).

Later, Carlile (1977) investigated state anxiety responses for high and low speech anxious subjects in two types of stress situations (physical-stress and ego-stress) on 92 male students. It was found that high anxious speech (HAS) subjects responded with a differentially high degree of physiological activation (state anxiety) than did low anxious speech (LAS) group under ego-stress conditions, whereas, there was no differential increase in A-State between the HSA and LAS subjects during physical-threat condition. Wankal (1977) investigated as to how a personal disposition A-Trait factor and a situation factor (number of observers) affect state anxiety. Thirty high and thirty low trait anxiety females classified by the STAI, were randomly assigned to one of three treatment conditions: Alone; two evaluative observers; five or six evaluative observers. Results supported the prediction that the level of trait anxiety determines state anxiety. Pleeg (1979) administered the Dutch version of the STAI to medical students. This study also supported Trait-State
Anxiety theory by demonstrating that the increase in A-State level was high for the group of high A-Trait students than for their low A-Trait counterparts. Similarly Head (1982) found that state anxiety means of the high trait anxiety groups were significantly higher than the state anxiety means for low trait anxiety groups for all three phases (during input processing, output processing and final processing) of their experiment. Also, the state anxiety means of the high and average trait anxiety groups were significantly higher than the state anxiety means of the low trait anxiety groups for the input and output stages. Hamann (1982) also found that subjects with high trait anxiety exhibited significant increase in state anxiety. Similar results have also been reported earlier by King, Hunrich, Stephenson and Spielberger (1976), Thompson (1977), Joesting and White (1977), Worly (1977), and Grinnell and Kyte (1979).

In another set of studies, Mullner and Sebej (1980) studied trait anxiety scores for male and female students taking part in psychological experiment in which two extreme groups were formed and changes in subject's actual state anxiety were compared before and after the experiment. A significant decline in state anxiety was noted in the whole group after the experiment. An analysis of the changes in the responses revealed that in the high trait anxiety groups responses were significantly
altered in 10 items about the actual state as against
in their low profile opposites. Weinberg and Genche
(1980) administered the Sport Competitions Anxiety Test
(SCAT) to 63 inter-college golfers. Results showed a
significant high competition trait anxiety (CTA) main
effect, with low CTA subjects, displaying lower state
anxiety than moderate or high CTA subjects. Potear
and Weinberg (198C) found that subjects high in
competitive anxiety displayed higher level of state
anxiety than subjects with moderate or low anxiety about
competition. The general trend of such studies is that
level of A-Trait is associated with subsequent level of
A-State, more particularly in situations involving threats
to self-esteem. A few studies, however, do not lend
support of this contention (e.g., Morris, 1971; Morris &

Endler, Magnusson, Ekehammar, and Okada (1976)
have empirically investigated the relationship between
A-Trait and A-State for a sample of Swedish college
students. Since Spielberger's (1972a) theory implies
that under neutral conditions A-State and A-Trait are
relatively independent on one another, Endler et al. (1976)
attempted to empirically test this proposition. For the
Swedish college students, A-State and A-Trait were highly
correlated under neutral conditions. If, in fact, A-Trait
and A-State are highly correlated under non-stressful
conditions, then it may not be justified to treat them
as two distinct concepts.

In examining the relationship between A-Trait and A-State, it is necessary to consider the nature of the evaluative situations in the context of possible person by situation interactions (Endler & Hunt, 1969; Endler, 1975a). Furthermore, in order for trait anxiety and a particular stressful situation to have an interactive effect on the arousal of A-State, the component (or dimension) of A-Trait must be congruent with the stressful situation (Shedletsky & Endler, 1974; Endler & Okada, 1975; Endler, 1975a, 1975b). Furthermore, in some situations it is possible to arouse one aspect of A-State (e.g., autonomic and physical responses) but not others (e.g., avoidance responses), which suggests that the A-State may also be multidimensional. In fact, Endler et al. (1976) have provided some evidence for the multidimensionality of A-State.

A critical evaluation of the research literature shows that high A-Trait subjects tend to show performance changes attributable to higher 'D' in situations characterised by psychological stress, such as failure or threat to self-esteem (ego-threat) but not in situations involving physical-danger or threats of harm (Spence & Spence, 1966; Spielberger, 1966, 1971). Thus, in order for an experimental situation to evoke differential levels of A-State in subjects who differ in A-Trait some
type of psychological stress (ego-threat) appears to be required. As mentioned earlier, the Western research has also confirmed that under ego-threatening situations, persons high in A-Trait tend to experience greater increase in A-State than do persons low in A-Trait (Milliment & Gardner, 1972; Spielberger et al., 1972; Rappaport & Katkin, 1972; Meyers & Martin, 1974; Glover & Cravens, 1974; Lamb, 1976; Archer, 1979; and Hobfitt et al., 1983). In another study, Kendall (1978) concluded that General Trait-Anxiousness (GTA) and physical danger measures produced a significant increase in state anxiety. In a study by Lewis et al. (1978), the significant findings were: i) high A-Trait subjects responded to the ego-threatening instructions with greater elevation in A-State; ii) the A-State level of high A-Trait students were reduced with the two minutes interval. Glanzmann and Laux (1978) found that low and high A-Trait school going subjects in the threat pains condition responded with nearly the same A-State elevation, whereas, high A-Trait subjects showed a greater increase than low A-Trait subjects in the ego-involving situations. Collectively, these results support the trait-state conceptualization of anxiety.

Schmitt and Lazarus (1979) exposed three stories to the subjects of which two were threatening and other one relaxing. High trait anxiety subjects reacted with greater state anxiety to these stories than
low anxiety counterparts. Murphy (1980) studied the effects of experimentally manipulated stress and trait anxiety on state anxiety and listening comprehension. Results indicated that subjects in high stress conditions have significantly higher A-State and lower total listening comprehension scores than subjects in the low stress conditions. Recently, Hobfall et al. (1983) examined whether persons who differed in A-Trait experienced differential A-State elevations in consecutive ego-threatening conditions which were thought to vary in their level of ego-threat. The subjects were 312 candidates for admission to the Faculty of Medicine in University in Israel, and were examined as to their state and trait anxiety just prior to two selection interviews. The candidates were explicitly informed before the interview that their grades and examination scores are no longer considered and their 'performance' during the interview will be determining factor. The findings supported the hypothesis derived from Trait-State Anxiety theory. High A-Trait individuals responded with higher elevation in A-State than did medium A-Trait individuals, who in turn, responded with higher A-State than did low A-Trait individuals during both interview conditions. As further hypothesised, only the high A-Trait individuals manifested a significant change in A-State between conditions of varying ego-threat, decreasing in A-State from time 1 to time 2. A smaller decrease was observed
in the medium A-Trait group and there was essentially no change in A-State in the low A-Trait group. This interaction effect appears to reflect differential A-State response to the two conditions of ego-threat, which varied in the degree to which they were perceived as threatening by the high A-Trait individuals. The high A-Trait group responded with the highest A-State elevation and were most reactive to changes in the level of ego-threat from one condition to another. This finding reflects the greater sensitivity of high trait anxious individuals to nuances of ego-threat in their environment and as such is an extension of a principle that is implicit in Spielberger's Trait-State Anxiety theory. This finding proved that the theory is quite robust across cultures, in this case from the United States to Israel. Although this study did not attempt to test Trait-State Anxiety theory under conditions of physical threat, another investigation in Israel replicated the nondifferential effect of high versus low A-Trait women under hospital conditions of physical threat (Margalit et al., 1980).

Taken together, both these studies attest to the cross-cultural generalisability of Trait-State Anxiety theory. Sharma (1976), on an Indian sample of high school students, who found a significant increase in state anxiety due to failure feedback in subjects with high trait anxiety only. The findings of Sharma's (1976) study are also in agreement with earlier Western studies in this area.
In another study on university students in India, Sharma and Dang (1977) concluded that although trait anxiety is primarily a dispositional measure of individual differences in responding to situations involving threat to self-esteem, it is also related to individual differences in responding to physical danger. Thus, it appears that when university students in India, particularly males, report that they are frequently anxious on the A-Trait scale of the STAI, they not only indicate fear associated with situations involving threat to self-esteem, but also, to some extent, their concern with regard to physical danger.

In some of the studies state anxiety has been related to stress management training programme. The purpose of Rose's (1982) study was to evaluate the impact of a twelve hours' stress-management training programme on three dependent variables, i.e., state anxiety, trait anxiety and locus of control of 50 type A and type B undergraduate and graduate students. The results indicated that the experimental treatment was significantly more effective than the control treatment in reducing state anxiety only. Hooper (1982) presented preliminary evidence of positive effects of stress-management training in reducing adolescents' state anxiety. Johanson's (1983) study was also consistent with the above finding that students who received the stress-management programme
experienced significantly less state anxiety and depression than the subjects who did not undergo this programme.

The general trend of such studies is that the level of trait anxiety and kind of stress determines the level of state anxiety in varied forms. A review of studies also shows that there is somewhat conflicting evidence regarding the nature of relationship between A-Trait and A-State.

3-2 EFFECTS OF TASK DIFFICULTY ON STATE ANXIETY

According to Drive theory, the subjects who are high in A-Trait respond with high level of A-State to difficult task and have higher probability of error. Johnson, Horn and Dunbar (1973) tested this assumption by taking two anxiety (HA & LA) groups and assigning them to a difficult or easy tasks. High A-Trait subjects did not demonstrate higher levels of A-State than low A-Trait subjects on easy tasks, but did so on the difficult task. Okameto (1977) found that randomly ordered programmed learning material induced high state anxiety. Polly and Saffard (1977) investigated the effects of task difficulty and ambivalent achievement motives on state anxiety and performance. They found that the interaction of task difficulty and ambivalent motives produced changes in state anxiety and performance. Finch, Kendall, Dennenburg and Morgan (1978) investigated the effects of a difficult and an easy task on state anxiety in 30 emotionally
disturbed children. The measures of state anxiety for children were obtained during non-stress period and immediately after each task. The younger group did not show any differences in A-State following the two tasks while the older group showed significantly more A-State increase following the difficult task. Moreno (1978), while studying the relationship between anxiety and intellectual performance, supported the hypothesis that state anxiety, and not trait anxiety, varied with the difficulty level of preceding task.

Glanzmann and Laux (1978) investigated the effects of trait anxiety, kind of stressors and task difficulty on state anxiety and performance. They concluded that low and high A-Trait subjects in the shock-threat conditions showed similar increase in A-State while learning the difficult list, suggesting that attention demanded by the difficult learning task prevented low anxious subjects from focusing on shock anticipation. Fabrey (1982) also found that high state anxiety is experienced by subjects while solving difficult problems. Recently, Head and Lindsey (1983) demonstrated that high and low test anxiety subjects, learning a difficult form of test, had significantly higher state anxiety than their peers taking a less difficult form of the same test.

The general conclusion seems to be that task difficulty, itself and also along with A-Trait is
detrimental on the level of state anxiety. Thus, in studies dealing with state anxiety as a dependent variable, the task difficulty should either be systematically varied or controlled.

3-3 EFFECTS OF TRAIT ANXIETY ON PERFORMANCE

There is a plethora of theories and experimental studies concerned with the effects of anxiety on performance. The first systematic theory of anxiety and performance was developed by Spence and his coworkers (Spence & Spence, 1966). According to this theory, anxiety affects retrieval and performance but does not affect learning. While this view has been prevalent for many years, it is obvious that it is inadequate (see M.W. Eysenck, 1981). Contemporary wisdom now holds that anxiety affects performance by producing changes in the selectivity and/or intensity of attention. Within such an approach, anxiety can affect both the learning or acquisition of information and its subsequent retrieval. Some of the relevant evidence that provides the basis for this support has also been considered in the following discussion.

Much of the available evidence supports the contention that high test anxious people (a situational-specific trait) perform most tasks less successfully than their low test anxious counterparts in a variety of

There is a good empirical support for an interaction of the expected type between anxiety and task difficulty, with high anxiety subjects performing much worse than low anxiety subjects on difficult task but not on easy tasks (Deniels & Hewitts, 1978; Moreno, 1978; Srivastava et al., 1980; Jain, 1981).

If one assures that difficult tasks tend to incorporate more components or cues than easy tasks, then the narrowing of attention under high anxiety would have a greater detrimental effect on performance of a difficult task. It has been found that anxiety interacts with task difficulty on a variety of learning tasks. The results from 12 studies have been discussed by Eysenck (1981). In all the 12 studies high anxiety improved performance on the easy task (significantly so in five cases). In ten of the studies, high anxiety impaired performance on the difficult task (significantly so in two cases).
Pishkin, Vladimir, Fishkin, Steven and Lovallo (1978) studied the cognitive performance of 48 male hospitalised subjects who were high and low in anxiety and depression. He concluded that subjects who were high on the Taylor's MAS showed fewer errors to solution of the concept identification problem than those who were low on the Taylor's MAS. But, Mills (1983) found that the subjects who scored low on test anxiety failed to perform significantly better than those high scores on test anxiety scale. In India Varma (1977) concluded that: i) there is no significant differences between the two groups of high and low anxious undergraduates in production of complex geometric figures; and ii) low anxious subjects were significantly better than high anxious subjects in reproduction of simple figures.

One of the inadequacies of the studies in the literature is that task difficulty has typically been manipulated in ways which can not readily be related to contemporary theoretical conceptions. An attempt to clarify matters has recently been carried out by Hamilton, Hockey and Rejman (1977) taking a letter formation task. The major finding was a highly significant interaction between trait anxiety and task difficulty. In this interaction, anxiety had not greatly impaired performance on three and four-letter problems.
3-3.1 Paired-Associates Task

Paired-associates learning may be a better task with which to test the effects of anxiety on performance (Spence & Spence, 1966). A good number of studies have been carried out on subjects differing on general (trait) anxiety. Mohsin (1972) showed that high anxiety subjects learned paired-associates task at slower rate than their low anxious counterparts. Rabindradas and Narayanan (1977) concluded that subjects with low drive (low anxiety) perform better than high drive subjects (high anxiety) in associative learning task. Glanzmann and Laux (1978), using easy and difficult lists of paired-associates, reported that high A-Trait subjects performed more poorly than their low anxiety counterparts on the difficult list, whereas there was no significant difference in performance on the easy lists. Similar results were also obtained by Paul (1980). Timpson Davidson and Farley (1978) studied the learning efficiency as a function of learning strategies and individual differences in anxiety and achievement motivation with subjects made to learn a paired-associates list under one of the three experimental conditions, namely repetition, mediation, and control. Although, mediation proved superior to rote repetition, both techniques were inferior to the control. Anxiety was positively correlated with performance under rote repetition only. Gupta and Gupta (1978) identified high-
problem (HP) and low-problem (LP) girls on the basis of their performance on the Mooney Check List, and then they were tested on a paired-associates learning task. HP girls produced more complete responses and stimuli repetitions than LP girls indicating that HP girls performance pattern appears to evoke high anxiety level in adolescent girls.

Recently, Carrillo and Marine (1984) found that test anxiety (situation-specific trait anxiety) did not interfere with performance on paired-associates task. However, the debilitating effect of test anxiety on recall was obtained on the memory for sentence task. Memory support strategy had a beneficial effect on both high and low test anxious students' paired-associates recall. Nijhawan (1972) showed that high test anxiety school group learned difficult paired-associates task at slower rate than their low test anxious counterparts. Varma and Nijhawan (1976), on a difficult paired-associates task, showed the debilitating effects of test anxiety under certain conditions and not all.

However, the results of another set of earlier studies did not support the hypothesis of differential performance of high and low anxious subjects on easy or difficult paired-associates task (Harleston & Cunningham, 1961; Levitt & Gross, 1961; Herleston, 1963; Sessenrath, Kight & Athey, 1964). Weiner (1966) showed that
performance differences of high and low anxiety subjects, on easy and difficult tasks by subjects are a function of perceived success or failure, not of task difficulty. Task difficulty, he argued, is important for performance only because success is the likely outcome on easy task and failure the probable result on a difficult one. Similar findings have been reported by Weiner and Schneider (1971) when high anxiety subjects were superior to low anxiety subjects in performance with success feedback. In most of these studies task difficulty was not clearly delineated.

3-3.2 Anagrams and Problem Solving Tasks

Experiments have shown that high anxiety subjects perform less well on problem solving tasks than their low anxiety counterparts (Sinha & Singh, 1959; Ravichandra & Vazir, 1974). Phillips et al. (1972) have shown that high anxious school children approach problem solving tasks in a rigid, stereotyped manner, which would indicate that anxiety interferes with adaptation to different problem solving strategies in response to the particular demands of the task. Bruch (1978, 1981) found that highly test anxious individuals used poorer problem solving strategies. Dey (1978) studied the speed of anagrams solution as a joint function of manifest anxiety and number of category sets. He found that anxiety facilitated performance in the presence of single category set, but inhibited
performance when multiple sets were concurrently operative. He further demonstrated a facilitative effect of manifest anxiety with anagrams derived from high frequency words and the inhibitory effect with anagrams derived from low frequency words. Thus, task difficulty emerged as an important variable. However, in a study by Gotlib and Asarnow (1979) on depressed and non-depressed university students, trait anxiety was positively related with anagrams performance. Blum and Barbour (1979) studied selective inattention to anxiety-linked stimuli, using anagrams approach to fair letter words. Finding indicated an increased likelihood of response delays in the presence of anxiety-linked stimuli.

Nottelmann and Hill (1977) showed that high anxiety children had significantly inferior anagrams performance as compared to their low anxiety counterparts. Further, the high anxiety children were observed to engage in substantially more off-task glancing. Earlier, Stinke (1973) had also pointed out that with neutral observers, the low anxious performed significantly better than high anxious students, whereas, positive observers led to the better performance of high anxious students. Studies have also indicated that high anxious children take more cautious approach to problem solving task (longer decision times and more redundancy) than low
anxious children (e.g., Messer, 1970; Hill, 1972). However, Goldklang's (1982) study indicated a positive linear relationship between state-test anxiety and performance for moderate difficult anagrams and problem solving tasks. Recently, Covington (1983) concluded that the performance of high anxious students is poorer to their low anxious counterparts on difficult problem solving task. As the task became more difficult, highly anxious children did worse. Further, high anxious subjects spend less time overall on each problem. These two outcomes reflected the negative effects of anxiety (i.e., low test involvement and limiting task focus). Prabha (1984) also found that high test anxious subjects performed poorly than low anxious subjects on a difficult anagrams task. Similar results have earlier been reported by Nottleman and Kennedy (1977), Tobias (1979), Deffenbacher (1977). Recently, Carver and Scheier (1984) reported a study by Carver et al. (1983) in which both the high and low test anxiety were used as subjects. In a moderately evaluative setting the subjects were tested individually. 12 anagrams, of moderate and high difficulty levels were used. Mirror in wall was used to manipulate their self-focus while working on the anagrams task. As a result, the low test anxious subjects performed better than high test anxious subjects on both high as well as moderately difficult tasks.
3-3.3 Other Learning Tasks

The detrimental effect of high general (trait) anxiety on serial verbal learning has been reported by Spielberger and Smith (1966), Hodges and Spielberger (1969), Krishna and Verma (1972), Passi and Singh (1972), Gakhar and Luthra (1974), Geen (1976), Sharma and Wangu (1976) and Ravinder (1977).

The effect of test anxiety on serial verbal learning has been highlighted by Ganzer (1968), Sarason (1975) and Sharma and Sud (1982). In most of these studies highly anxious subjects showed poorer level of performance than their less anxious counterparts. But serial position effect has not been taken into consideration in most of these studies (Passi & Singh, 1972; Sarason, 1975; and Sharma & Sud, 1982). Deshpande (1978) demonstrated the differential effects of isolation and meaningfulness on the performance of high and low anxious subjects on serial verbal learning. Deshpande and Kawane (1982) found that the moderate-anxious group was superior in performance to high and low anxious groups. But Carrillo and Marine (1984) found that test anxiety did not interfere with subjects' performance on serial learning.

In addition, the detrimental effects of high anxiety have been demonstrated on recall and recognition (Mueller, 1976; Mueller, Carlomusto & Marler, 1977, 1978;
Mueller, 1978; Head & Lindsey, 1983; Garg, 1976; and Srivastava, 1977, 1979); incidental learning (Akhtar & Sowaid, 1972; Garg, 1976); concept formation (Denney, 1966; Kianoosh, 1977); verbal and patellar reflex conditioning (Dixit & Sharma, 1971a, 1971b; Nagpal & Sen, 1976) with inconsistent findings. Experiments have also shown that high anxiety subjects perform less well in maze learning than low anxiety subjects (Nijhawan & Cheema, 1971; Nijhawan, 1972). In most of these studies no clear account is given about the difficulty level of the tasks and pre-performance instructions, if employed.

The use of Digit Span tests has consistently shown that high anxious subjects recall fewer digits than low anxious subjects (e.g., Mueller, 1977) but the difference is not always statistically significant (Haynes & Gormly, 1977). However, two studies have found high and low anxiety subjects equivalent on digit span (Brower & Mueller, 1978; Mueller, 1976), but Mueller and Overcast (1976) found that high anxious subjects had greater recall from short-term store. Upadhyay (1978) showed that high anxiety adversely affects digit span, but zeigarnik effect has been found to operate equally well for both the high and low anxiety subjects (Singh & Singh, 1979). On a digit number task, Purohit and Khare (1979) also found that high anxiety has debilitating influence on immediate short-term recall, but they also concluded
that this effect is independent of memory load or the nature of the interpolated material. All these Indian studies have considered general (trait) anxiety measures. In addition, Kumar and Krishna (1982) showed that effects of test anxiety on handwriting are reflected in height, weight and space between words. Carrillo and Merine (1984) also obtained the debilitating effect of test anxiety on recall for the memory for sentence task.

In another set of studies, Mayer (1977) investigated the effect of trait anxiety on performance of various simple rote problems. There was a highly significant interaction between anxiety and type of task in terms of the proportion of correct solutions. It was concluded that anxiety had little effect on rote problems, but the high anxiety subjects were considerably inferior to low anxiety subjects on cognitive problems. Thus, the nature of the learning task emerges as an important factor. Wankal (1977) found that trait anxiety significantly effected pursuit motor performance. Lewis et al. (1978) studied the effects of state and trait anxiety on male and female undergraduates of average aptitude. It was found that low A-Trait subjects demonstrated superior reading comprehension than high A-Trait subjects. However, Griffiths and Vaccaro (1979) found that there was no significant relationship between anxiety and performance on relatively simple task. Renee, Paul and Glenn (1978) reported that anxiety
influenced girls' performance on the more complex verbal fluency task but did not alter boys' performance. Thus, gender differences noted to be considered in an experimental design dealing with anxiety-performance relationship. Weiner and Schneider (1971) considered task difficulty as well as success failure feedback by giving their subjects false social norms indicating that they were succeeding at a different verbal learning task or failing at an easy learning task. Under these conditions, subjects high in anxiety performed better on the difficult task and worse on the easy task than subjects with low anxiety. Most of these studies are related to general anxiety only. It has been concluded that the effect of anxiety depends upon both task difficulty as well as the criterion of performance.

3.4 EFFECTS OF INTELLIGENCE ON PERFORMANCE

The relationship between intelligence and learning has been studied for many years. Garner and Dubois (1967) and Stevenson, Hale, Klein and Miller (1968) obtained significant correlations between laboratory tests of learning with intelligence as well as performance in school settings. So far most of the studies have used verbal measures of intelligence which depend too highly on verbal material and whose items are closely associated with the kind of learning in schools. Lunge (1974), Lewis and Todd (1978) found that the achievement
in school courses has low, positive but significant correlations with non-verbal measures of intelligence. Ogunlada (1978), in an attempt to provide an estimate of the predictive validity of the RPM (Raven's Progressive Matrics), found that the RPM exhibited low validity for predicting school achievement (see also Rao, 1974; Lawrence, 1978). Weinstein (1978) provided some empirical evidence for the point that bright students use different strategies for learning and remembering than dull students. Also, it is unlikely that all students would find the same cognitive strategies equally effective. Information in the literature about cognitive styles suggest this conclusion (Pask & Scott, 1972). Experimental studies involving 7 year-olds explored the relationship between individual differences in guiding restructuring, intelligence and learning, when working memory span was controlled, have been conducted by Rich (1983). The results showed that guided restructuring explained additional variance in intelligence and learning, over and above that explained by span. By factor analysis it was found that guided restructuring loaded on one factor with gain and span loaded on another factor. These findings suggest that the guided restructuring test or tap a factor which is distinct from working memory and which plays a significant role in intelligence and learning. Thus, intelligence has to be considered as an important factor in determining the
difficulty level of a learning task (see Gaudry & Spielberger, 1971).

3.1.1 **Paired-Associates, Anagrams and Problem Solving Tasks**

In a very comprehensive work, Vibha (1972) evaluated the relationship of learning with intelligence. Intelligence tests used were Hindi Version of Hundal's GMAT and IPAT-Culture-Fair Intelligence Test-Form A. Various miniature learning tasks involved verbal mediation task (paired-associates learning), digit learning task, tasks of rote type (serial learning), and five measures of academic-achievement. It was found that tasks involving verbal mediation correlated significantly with intelligence and school learning. Digit learning task also correlated significantly with intelligence measure. Ravinder (1977) concluded that in paired-associates task of moderate difficulty high intelligent subjects perform better than low intelligent studies at all the stages of learning. Thompson (1973) found a significant positive correlation between the WAIS and anagrams solving, but Hayes (1978) could not find such a relationship. Engemann (1974) experimented on strategies of problem solving behaviour of children at various age levels. He presented periodic sequences of geometric symbols of test. Groups with higher intelligence scores employed significantly more often a strategy based on examination of short-test periodic sequences independently.
Meyer (1975) reported a significant positive relationship between intellectual abilities and mathematical problem solving behaviors.

Earlier, Krivaneck and Zdrahal (1974) studied individual and group differences in solving individual games and set of 7 geometrical mosaics. No significant differences were found as a function of intelligence. On the other hand Skaves and Sullivan (1974) concluded that low IQ subjects do benefit from direct practice of strategies involved in the solution of complex problems. Raaheim and Kaufman (1974) reported a clear relationship of general intelligence and problem solving among males, but among females, fewer solutions were attained and IQ was not clearly related to the problem solving.

Jaswinder (1980) concluded that above average and average intelligence groups do differ on the average right scores on anagrams. But the differences in the means of two intelligent groups was found to be not significant for wrong and unattempted scores. It means that the performance of both the intelligent groups may be considered as equal with regard to number of wrong and unattempted scores on anagrams. Robert and Tharp (1980) showed that lower IQ subjects who were successful in tasks of problem solving, employed the same number of self-instructions as high IQ subjects. However, recently Konefal (1984) demonstrated that, besides other variables,
IQ is a significant predictor of maintenance of social problem solving skills. In any case, it is clear that IQ needs to be controlled or systematically varied in studies dealing with anxiety performance relationship.

3-5 EFFECTS OF STRESS ON PERFORMANCE

The variable of 'stress', whether psychological or physiological, has been used to arouse differential levels of state anxiety in high and low trait anxiety subjects, and to explore the resulting possibility of its differential effects on performance. 'Stress' has been a co-variable in anxiety studies. Thus, there are not so many studies available concerning the effects of stress on learning as such.

On a task of nonsense syllables, Bardach (1960) showed that it was late rather than early introduction of situational stress that impaired performance. Murphy (1980) concluded that stress influences listening comprehension. Earlier, Goldstein and Dorfman (1978) found that speed stress had a significantly negative impact on performance on a task dealing with moving visual stimuli. In a recent study by Harris (1982) the experienced stress and performance formed negative linear relationship. On the other hand, Mills (1983) concluded that it may only be the group of individuals, whose anxiety level prevents them from controlling worrisome thoughts.
experienced during performance of task under high stress, whose performance is impaired.

Generating three stress conditions with different combinations of a flashing light, electric shock and noise, Naidu and Thapa (1978) found that stressed subjects made more errors in distance judgements, and the errors caused by stress increased as the distance judged increased objectively. Earlier, Ravinder (1977) found that learning occurred at slower rate under ego-stress as compared to the learning under neutral conditions. Chatterjee, Bhattacharya and Bhattacharya (1978) showed that in perceptual tasks stress increased performance significantly as compared to that of non-stress conditions, but in conceptual task stress decreased the performance. It implies that the effects of stress may vary with the nature of the learning task. Effect of stress (failure) on performance have also been shown to be dependent on the nature of learning task by Chatterjee et al. (1978). Recently, Srivastava and Naidu (1982) revealed that the perceptual accuracy (based on a vigilance task) is greater under moderate ego-stress conditions and the lowest under high-stress conditions. Srivastava (1982) studied the relationship between stress and performance in high and low impulse control subjects. An inverse U-type relationship between stress and performance for high as well as low impulse control subjects was found. However,
the high impulse control subjects did not show deterioration due to increase in degree of stress. On the whole, it appeared in this study that the stress-performance relationship is curvilinear. In this study, impulse control emerged as a moderator of stress-performance relationship.

Wolk and Bloom (1978) studied the interactive effects of locus of control and situational stress on performance on 7th and 8th grade students, previously selected on the basis of high and low scores on the Intellectual Achievement Responsibility Scale. Results indicated that: i) those with internal locus of control were capable of sustaining task performance under high-stress, but those with external locus of control experienced performance decrements as the stress increased; ii) time to complete mathematics task reflected a facilitating effect of stress for internals but a debilitating effect of stress for externals; iii) there was an interactive relationship between type of stress (threat to ego vs. threat to instrumental performance) and expectancy for control in influencing the reactions to stress. Thus, locus of control emerged moderator of stress-performance relationship.

3-5.1 Paired-Associates, Anagrams and Problem Solving Tasks

Ravinder (1977) showed that under controlled condition, high school girls performed better on paired-
associates task of moderate difficulty than under conditions of ego-stress. On the other hand, Paul (1980) concluded that the recall of paired-associates words was not improved by reassurance instructions given by experimenter. Heuser (1978) introduced three forms of stress (manipulated frustration, time pressure and disapproval) into problem solving tasks demanding rearrangement of number sequences. He found that interactive effect of stress and sex to be significant.

Heuser (1978) has also discussed several factors that could hamper the performance of female subjects under conditions of stress. Dych et al. (1979) studied 80 female undergraduates who were given a preliminary problem solving tasks of either short or long duration and were told that they could shorten the duration of aversive noise bursts by correctly solving the problems. They were then given false feedback that they had done either well or poorly. Two groups of failing subjects were given information designed to learn them to attribute failure to either task of ability or to a difficult task. Two additional groups received success or failure feedback without attributional cues. Failure-induced stress was reported to be greater under short than under long duration conditions, and increased to the extent that subjects were led to believe that they were personally responsible for failure. Gastorf (1981) showed type A or type B personality patterns to be moderator of stress-anagrams performance relationship.
In general, these findings also suggest the importance of such factors as intrinsic motivation, the type of task and the subjects' past history of success and failure within the relevant motivational sphere, while conducting stress research. These studies specifically highlight the mediating influence of personality dimensions on stress-performance relationship.

3-6 EFFECTS OF ANXIETY AND INTELLIGENCE ON PERFORMANCE

There are suggestions in the literature that the relationship between anxiety and learning may be being obscured by an anxiety X intelligence interaction. Studies by Denny (1966), Katahn (1966), Spielberger and Smith (1966), Gaudry and Spielberger (1970, 1971), Skaalvik (1977), Limann (1977) showed that anxiety facilitates learning at upper levels of intelligence, whereas, it is associated with poor performance at lower level of intelligence. In Indian context Kanekar (1977), Kanekar, Neelakantan and D'Souza (1977), Ravinder (1977), Sharma (1978), Sethi and Sud (1980), Sharma and Rao (1983a, 1983b) and Sharma, Dang and Spielberger (1985) have highlighted such a possibility when dealing with anxiety-academic performance relationship.

O'Rourke (1978) found that anxiety proved to be particularly debilitating for middle ability group. Earlier, Binder (1976) observed this interaction to be
significantly for girls only, and Limann (1977) found that increase in test anxiety resulted in lower achievement for more intelligent boys of lower social class. Galassi, Frierson and Sharer (1981) noted that test anxiety is but one factor affecting test grades, some individuals who are anxious about tests nevertheless perform well on these tests. On the other hand, the results of an earlier study by Stutler (1973) did not support the assumption of Spielberger's extension of Drive theory and found that high anxiety facilitates performance of low ability groups. Further Bejtelsmit (1978) failed to find significant anxiety X intelligence interaction. The relationship between anxiety and such complex variables as intelligence is complex one. In recent years studies have been conducted with the digit span sub-scales of the WISC. The early studies in this area produced conflicting results.

3-6.1 Paired-Associates, Anagrams, Problem Solving and Other Learning Tasks

Harleston (1963) tested the hypothesis that the operation of anxiety effects depends upon both task difficulty and ability level. For the easiest paired-associates list, Harleston (1963) found a significant trial blocks X ability level X anxiety interaction. This interaction indicated that high anxiety subjects, who were slow learners (presumably lower in IQ), performed
more poorly than did low anxiety subjects of comparable ability early in learning, but in later stages of learning, high anxiety subjects performed better than low anxiety subjects. Gaudry and Spielberger (1970) reported differential effects of anxiety and intelligence on performance at different stages of learning of five easy paired-associates. They concluded that early in learning high anxiety facilitates the performance of high IQ subjects as compared to their low anxiety counterparts. In Indian setting, Ravinder (1977) concluded that, on a paired-associates learning task of intermediate difficulty, high anxiety facilitates the performance of high IQ subjects while leading to performance decrement in subjects of lower intelligence. But Sud (1984), who studied the relative efficacy of certain cognitive coping strategies on the performance of high and low test anxious students, concluded that the hypothesized detrimental effect of test anxiety was not nested in high test anxious-high cognitive capacity girls. Further Rabinendra and Narayanan (1977) studied the effects of Drive (anxiety) on associative learning and concluded that the subjects with low drive performed better than their high drive counterparts. Verma (1973), who studied the effect of anxiety (test), task difficulty (easy & difficult) and reinforcement (praise, reproof and praise & reproof) on paired-associates learning task at three levels of intelligence, demonstrated significant
interactions among the variables. In general, on easy
tasks and at high and middle levels of intelligence,
anxiety facilitated learning, but on difficult task
anxiety significantly impaired performance at the lower
level of intelligence. Low anxiety subjects under
praise always performed better. It was concluded that
it is not the task difficulty but the experimental
conditions that determine the learning. Verma and
Nijhawan (1976), on a difficult paired-associates task,
concluded that test anxiety shows its debilitating effects
under certain conditions but not all. At the upper level
of intelligence neither anxiety nor reinforcement has
significant effect on the performance. At the lower
level of intelligence, anxiety interferes with learning
under all reinforcement conditions (praise, praise &
reproof, and reproof alone). In this study, the most
effected group was the one with middle intelligence
level.

But Glanzmann and Laux (1978) found that on
simple paired-associates task high anxiety facilitated
the performance of all the subjects irrespective of their
level of intelligence. But, Doyal and Forsyth (1972)
reported no significant relationship of anxiety and
intelligence on a problem solving task. However, the
general implication of such studies lies in considering
task difficulty and also cognitive ability as important
variables for meaningful investigations.
Data bearing on the interaction between anxiety and stress in determining performance on complex learning tasks have used three major types of stress conditions single or in combination. These are ego-involving instructions, induced failure experience on a prior-task, and application of noxious stimulation such as electric shock. The indices by which stress reactions are evaluated have been physiological measures (e.g., changes in heart rate, blood pressure, and galvanic-skin response) as well as self-report measures.

Whether persons who are high or low in anxiety proneness respond to stress with differential elevations in state anxiety by and large, depends on the nature of stress situation (Spielberger, 1972). Performance differences in high and low anxiety subjects are most often found under conditions of psychological stress. Evidence has already been reported in this chapter to show that individuals high and low in trait anxiety respond differentially to ego-threat but not to physical-danger situations. A further difference between the effects of the two classes of stressor conditions has been discovered by Morris and Liebert (1973). Recently, Deffenbacher (1978) suggested that highly anxious individuals are more susceptible to distraction from task-produced competing responses under conditions of high
stress, i.e., task-generated interference which is the tendency to be susceptible to or distracted by irrelevant parameters. Moreover, Butler (1981) has shown there is a strong positive relationship between levels of stress and anxiety as they contribute to dysfunctional and pathological states in human organism, including performance.

Eysenck (1979) has discussed the effects of failure and shock on the performance of high and low anxiety subjects. Failure feedback consistently impaired performance to a greater extent for high anxiety than for low anxiety subjects, but shock has the opposite effects. While the differential effects of shock and failure on high and low anxiety subjects are hard to explain in terms of the notion that all arousals simply produce attentional narrowing, the alternative explanation is that the threat of failure increases worry rather than emotionality, whereas, threat of shock heightens emotionality and not worry (Morris & Liebert, 1973). Since it is argued that performance decrements under high anxiety are largely attributed to worry and other task-irrelevant cognitive activities, it follows that failure should be more effective than shock in reducing performance for high anxiety subjects.

Empirical evidence relating to the interactive effects of stress (different types) and anxiety on the
performance of different laboratory learning tasks with special reference to paired-associates learning tasks, anagrams and other problem solving tasks has been discussed hereafter.

3-7.1 Paired-Associates, Anagrams, Problem Solving and other Learning Tasks

Hogan (1971) investigated the effects of anxiety stress, task difficulty and stages of learning on performance on paired-associates tasks. Results revealed that the performance of high anxiety group on an easy task was essentially the same as the performance of both medium anxiety and low anxiety subjects. No significant differences in the performance of three anxiety groups on tasks of medium and high difficulty were obtained. Under stress conditions, the performance of all the three anxiety groups on easy tasks was equivalent. The predictions of Drive theory were supported under certain qualitative conditions only, i.e., under ego-stress instructions, failure-reports, and situations where the high anxiety subjects' dependency needs were not gratified. Such studies of anxiety and experimental conditions suggest that there is a combined effect of experimental conditions, anxiety and level of difficulty of the task that is used. In a study by Glover and Cravens (1974), with a paired-associates transfer task, high and low anxious subjects learned a list consisting of changed and unchanged pairs while exposed to conditions of either
failure-threat, shock-threat, or neutral instructions. Correct responses on unchanged pairs were related to a trait anxiety by stressor interaction. Ravinder (1977) had shown that low anxiety subjects under ego-stress performed better than high anxiety subjects under ego-stress in the early stages of learning on easy and difficult paired-associates tasks. But in the later stages, high anxiety subjects performed slightly better than their low anxiety counterparts. Conversely, under the control condition, high anxiety subjects performed better than low anxiety subjects in the early stages of learning, while in later stages the performance of both the groups was almost similar. Schmolling (1978) concluded that anxiety tends to weaken the bond between pairs of verbal associates and reduces the frequency of common responses for subjects learning under examination stress than under normal classroom settings. Paul (1980) found that reassurance differentially influences learning, with high anxiety subjects showing greater improvement in learning than their low anxiety counterparts.

Another important factor is the time interval between administration of the threat and the performance on a task (Sarason & Ganzer, 1973). Further, task complexity may itself be a significant independent variable. There is evidence that the performance of low anxiety on complex task is better under neutral conditions. On any given occasion, these detriments may exert a
combinative effect on task performance. However, in most of these studies, the effects of pre-experimental instructions, i.e., ego-threatening, reassuring, neutral, task difficulty, stages of learning have not been clearly delineated.

Phillips et al. (1972) has further shown that high anxious children approach a problem solving task in a rigid stereotypic manner, which would indicate that anxiety interferes with adaptation to differential problem solving strategies in response to the particular demand of the task. Heuser (1978) studied three differential forms of stress (manipulated-frustration, time-pressure, and disapproval). The task demanded the rearrangement of number sequences. The sex of the 120 subjects as well as their susceptibility to anxiety were also considered. The main factors of stress and anxiety as well as the interaction of stress with sex proved to be statistically significant. He has discussed factors that could hamper the performance of female subjects under stress. The disturbing effect of stress on problem solving has been interpreted as being caused by a shift in the subjects attention.

Deffenbacher (1978), Hasheman (1978), Sarason (1972a, 1973), Sarason and Stoops (1978) have concluded that high test anxiety individuals perform poorly on difficult anagram strategies as compared to their low
test anxiety counterparts under evaluative stress and not under controlled conditions. Sarason's (1978, 1980, 1981) findings also indicated that under ego-involving conditions teamed with difficult material, high test anxious students tend to perform more poorly than their low anxiety counterparts. Additionally, Sarason and Stoops (1978) have offered evidence that highly test anxious persons under stress experience cognitive interference and pre-occupation that make time pass slowly and this results in poor performance.

Deffenbacher (1978) studied the worry and emotionality aspects of test anxiety in relation to evaluative stress on anagrams task of high difficulty level. It was also observed that for the highly anxious, the evaluative stress elicited interfering anxiety in the form of attentions to worrisome thoughts and ruminations, physiological arousal, and upset and elements of task irrelevance. Further, Deffenbacher (1978) noted that the lower performance of the highly test anxious is not a simple artifact of ability since the highly anxious performed as well or better than the less anxious when the stress was low. Evaluative stress appears to elicit behaviours which interfere with the performance of the highly anxious. Such findings have been confirmed in the literature by Deffenbacher (1980), Morris, Davis and Hutchings (1981), Wine (1980), Tayler and Tayler (1982), and Deffenbacher and Hazaleus (1985).
In India, there is only one related study by Sud (1983). She reported that the performance of high test anxious and high stress group was poorer in comparison with high test anxious - low stress, low test anxious-low stress groups. Thus, the evaluative stress aggravated the detrimental effects of high test anxiety on anagrams learning of moderate difficulty. However, Allison (1970) did not support the hypothesis that high anxiety subjects would be more adversely affected by stress. Similarly, Freehley (1970) obtained results contrary to the prediction of Drive theory. Etuegh and Gruffam (1973), on a task of rule acquisition, found that stress effects were similar to anxiety. On the easy portion of the task, anxiety and stress did not have any effects. Further, Murphy (1980) also found no significant interaction effects for stress and anxiety on performance. Mills (1982) suggested that it may only be in group of individuals whose anxiety level prevents them from controlling worrisome thoughts experienced during performance of task under stress, whose performance is impaired.

The findings in Western studies have been, by and large, consistent with the prediction of Drive theory and suggest that effects of stress and anxiety vary with the nature and difficulty/complexity of learning tasks. Most of studies, which have been reviewed had used tasks
of moderate difficulty. An important feature of stress depends upon the anticipation of something harmful, which is determined by subjects' past experiences and beliefs, etc., whether or not a stimuli is reacted to as threatening depends upon the cognitive appraisal of the situation by the subject. What is most important and most lacking, too, in the above studies is failure of these studies to make effective measurements of the stress effect, which are independent of the skills required for performance, to be index of induced stress.

3-8 *INTERACTIVE EFFECTS OF ANXIETY, STRESS AND INTELLIGENCE ON PERFORMANCE*

Katahn et al. (1971) examined Spielberger's (1966) extension of Drive theory to include the effects of intelligence. The learning lists (serial verbal learning) and the experimental procedure were the same as described by Montagu (1953) with the addition of ego-oriented stress instructions and standard task-oriented instructions. Neither the interaction between anxiety and difficulty was significant, nor anxiety by instructions interaction. Anxiety by trials blocks interaction also did not reach level of significance. However, the results, though not significant, were somewhat consistent with the results of Spielberger and Smith (1966) and with Spielberger's (1966) extension of Drive theory; high anxiety tended to facilitate the performance of high aptitude subjects and
impaired the performance of low aptitude subjects. 
Huang (1976) studied the effects of anxiety level and intelligence on performance in a syllogistic argument examination. Stress was induced by telling subjects that the test in syllogistic argument would count towards their mid-term grades. Stress was then reduced by allowing them to consult their notes during the test. High anxiety and low anxiety groups showed no significant differences in the test scores. The high intelligent groups on the other hand, scored significantly higher than medium and low intelligent groups. Ravinder's (1977) findings clearly indicated that: i) HI-HA group, under control condition, performed at higher level consistently at all the stages of learning than its low anxiety counterpart, under the experimental conditions of ego-stress. Similarly HI-HA group under control condition performed better than its counterpart under ego-stress at all the stages of learning; ii) at low-intelligent level too, ego-stress had detrimental effects on performance of both the anxiety groups but these effects were more pronounced in case of LI-HA group almost at all the stages of learning. Under control condition, performance of LI-HA group was slightly better than the LI-LA group except in middle stages; iii) the effect of ego-stress was so pronounced that performance of HI-HA was poorer to the performance of LI-HA under control conditions, especially in the early stages of learning;
iv) the effect of ego-stress seemed to be more pronounced in case of HA than LA subjects, irrespective of the intelligence level. Further, comparison in performance of ego-stress and control conditions revealed that learning occurred at much lower rate under ego-stress.

Since in the studies by Sharma and Rao (1983a) and Ploeg and Hulshof (1983) the detrimental effect of test anxiety on performance were more evident in high test anxious-high cognitive capacity subject, this further stresses the importance of the inclusion of intelligence as an independent variable in such studies. As is evident, there are very few studies that have considered anxiety, intelligence and stressor conditions together in studying anxiety-performance relationship. In fact, such a multivariate approach to this problem is called for so as to meaningfully determine under which stress condition and at which ability level, anxiety debilitates performance on different learning tasks of intermediate difficulty.

3-9 OVERVIEW

This review first dealt with the studies that have treated A-State as a dependent variable. In these studies the hypotheses of Spielberger's (1966, 1972, 1975) Trait-State Anxiety theory have been subjected to empirical scrutiny mostly on the Western samples. The
findings of these studies, by and large, support the contention of differential elevations in A-State in people who differ in A-Trait when exposed to ego-involving situations. On the other hand, situations characterised by physical-danger do not produce differential A-State elevations for individuals who differ in A-Trait. Thus, a major contribution of State-Trait Anxiety Inventory is that it has helped to clarify the relationship between type of threat (physical or psychological) and elevation in A-State for persons who differ in A-Trait. While individual reaction to ego-threat, or even appraisal of what is ego-threatening, in part, can be culturally determined, Trait-State Anxiety theory has been found to be quite robust across diverse groups in the Western cultures. Some evidence of its generalizability is also available in Israel and India, where two studies have supported it. Barring these two studies, no systematic and serious attempt has been made in India to cross-validate this theory (see Sharma, 1978, 1985). The availability of the STAI in 32 language Versions and the publication of more than 1800 studies with it, by 1982, make it an excellent tool for cross-cultural studies to test the predictions of Trait-State Anxiety theory. It is important to test these theories developed in Euro-American settings before a meaningful research is attempted in the important area of anxiety. Such a research can extend the range of the exact content of independent
variables involved in anxiety beyond that found in Euro-American cultures and can make anxiety theory more precise by identifying cultures in which people seem to behave out of line with the predictions based on an anxiety model developed in the West.

The studies dealing with anxiety-performance relationship have largely been guided by Drive theory, more particularly those conducted in India. Clearly, pre-performance information given to the subjects influences their level of attainment. When preliminary instructions have an evaluative or achievement oriented flavour, high anxiety subjects tend to perform at a low level relative to the control group. Contrary to it, an evaluative or achievement orientation seems to have a salutory effect on low anxiety subjects relative to a control condition. The apparent lack of differential performance of high and low anxiety subjects as observed in some studies is primarily due to the fact that evaluative-stress has not been employed in the experimental settings in these studies. The importance of the study of situational, cognitive and perceptual factors in anxiety needs to be emphasised since much research is needed to fill the gap in present knowledge. Moreover, anxiety tends to reduce performance on complex task but to facilitate performance on simple or over-learnt tasks. Similarly, the debilitating effects of anxiety are more likely to be seen in situations in which both difficult
material and ego-arousing conditions are utilized. It is also clear that intelligence (cognitive capacity) of the learner determines the difficulty level of the task to be learnt, and anxiety is only one factor that affects performance. Spielberger's (1966, 1972) extension of Drive theory incorporates individual differences in intelligence and thus, takes into consideration the variable of task difficulty. Evidence supporting this extension of Drive theory is scarce because of the traditional reluctance of experimental psychologists to come to grips with the individual differences. However, there is some evidence about anxiety \times intelligence interaction that determines the performance on a variety of tasks. But the patterns of interactions observed in these studies are not similar. These patterns of interaction may also be different for boys and girls. Thus, it is important to test this theory on groups who differ in trait anxiety and intelligence and perform on different learning tasks with task difficulty controlled or systematically varied. As is evident from the preceding review, relatively a few studies have considered anagrams and problem solving tasks as dependent variables. It would also be worthwhile to include ego-involving and reassuring instructions in the experimental design. In sum, an empirical test of Spielberger's extension of Drive theory is called for in setting to document its generalizability to these settings.
In the backdrop of the preceding review of the related studies and issues that emerged, the following hypotheses were framed for the purpose of the present study.

3-10 HYPOTHESES

Study I

Performance: Paired-Associates Task of Moderate Difficulty

i) 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 anxiety (LA) counterparts.

Study II

State Anxiety

ii) Regardless of intelligence level high school boys and girls with high trait anxiety (HA) will experience greater state anxiety than their low trait anxiety (LA), counterparts under ego-stress instructions, and not under reassuring instructions.

Performance: Anagrams and Problem Solving Tasks of Moderate Difficulty

iii) 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 as well as boys relative to their low trait anxiety (LA) counterparts.