Discussion of results is primarily based on the higher order significant interactions. By and large, discussion is arranged on the lines of results, i.e., it is presented in two phases. Phase I consists of discussion of the two laboratory learning tasks (Serial Verbal learning and Paired Associate learning). Phase II consists of discussion of school learning in real-life setting, i.e., academic achievement.

PHASE I

6-1 Interactive Effects of Anxiety (A-Trait), Intelligence, Psychological Stress and Stages of Learning on Serial Verbal Learning:

In the present study anxiety, intelligence, stress, and stages of learning have interactive effects on serial verbal learning. This interaction is interpreted in detail to show the level to level effects of all the factors involved, on each other. Castaneda (1956), Spielberger and Smith (1966), and Goulet (1968) put that it is imperative that the performance of HA and LA Ss be compared early in learning and later in learning on a task involving response competition. This has been supported by the present findings. A highly significant F obtained for the trial blocks (Table 5) shows that learning takes place at different rates in different stages of learning. While many experiments have compared the performance of HA and LA Ss in serial learning (Lucas, 1952; Montague, 1953; Lazarus, Deese, and Hamilton 1954; Saltz and Hoehn, 1957; Nicholson, 1958), only one (Spielberger
and Smith, 1966) analysed the data in a manner that opposing facilitative and inhibitory effects were unconfounded.

According to drive theory, it was expected that HA Ss would be inferior to LA Ss in the early stages and superior in the later stages of learning. The obtained results (A x B) have not supported the expectations. Performance of HA Ss is consistently superior to LA Ss (Table 5-5.2). However, performance of HI Ss is significantly better than LI Ss (A x C) at all the stages of learning (Table 5-5.3). This differential performance of HI and LI groups indicates that task has been sensitive to the range of individual differences in intelligence levels represented in the sample. Similarly, the effect of ego-stress has been significant. Ss under the control condition have performed significantly better than those under the stress condition (A x D) at all the stages of learning (Table 5-5.4).

It had been hypothesized that HI-HA Ss would perform better than HI-LA Ss and that the performance would be reversed for the two anxiety groups at LI level. The present findings have not supported this hypothesis. Interaction between anxiety and intelligence has not been found to be significant. Interactions involving B x C tend to be nonsignificant and this can be attributed to the prepotence of intelligence in effects on learning. There has been empirical evidence that anxiety effects on learning are differential at different stages (e.g. Taylor and Spence, 1952; Hicks, 1960; Spielberger and Smith, 1966). Further, according to Spielberger's extension of drive theory, it was expected that early in learning HA would facilitate performance of HI Ss while
leading to performance decrement in Ss with LI, but in later stages of learning HA might begin to facilitate performance of LI Ss. Findings are not in line with the expectations of this extension of drive theory. Nonsignificant interaction between Stages, anxiety, and intelligence (A x B x C) may have been due to the fact that effects of ego-stress in this interaction are confounded. It may be pointed out here that ego-stress has been a very significant variable in the present analysis. This is precisely the reason that lower level interactions have not been dealt with in detail. Another reason for nonsignificant interaction could be stated in terms of Yerkes-Dodson Law (1908). According to this law, the effects of anxiety are more marked only in the middle range of intelligence, where ability to perform is neither limited nor extensive. In case of extremes of ability, as is in the present study, anxiety effects are counterbalanced by the prepotence of intellectual factor. This has been found by Spielberger and Katzenmayer (1959), Bendig (1955), Spielberger (1958), Rusch (1960), and Sharma (1973).

In the results obtained in this study, the differences in performance have not been so much due to anxiety, as much as they are due to the experimental condition of ego-stress. It had been hypothesized that ego-stress instructions would induce differential levels of anxiety (D) in HA and LA Ss. Interaction between stages x anxiety x stress (A x B x D) has been significant (p < .01). This suggests that effects of stress varied from level to level of anxiety, over stages of learning (Table 5-6). Empirical findings have demonstrated all varieties
of relationships suggesting that stress conditions are complex in their effect and interact with a number of variables to determine performance (Farber, 1955; Lazarus, Deese and Osler, 1952; Martin, 1961; Spence and Spence, 1966; Singh, 1967; Catalana and Kirkpatrick, 1968). It has been found in the present study that impairment in learning has occurred due to ego-stress for both the anxiety (HA and LA) groups. It may be that the amount of ANS arousal due to ego-stress induced very high levels of drive in both the anxiety groups. High levels of drive thereby, leading to induced competing response tendencies in both the anxiety groups, debilitating effects on the performance of both of these groups. Under the control condition, HA Ss consistently performed better than LA Ss and the magnitude of difference increased with the increase in learning trials. It seems that amount of ANS arousal in the non-threatening experimental condition was not very high. Therefore, minimum of competing response tendencies were induced. This enabled HA Ss to perform better than LA Ss, who lacked drive to energize their responses. However, no conclusion can be drawn here and the findings can not be fitted into any of the theoretical formats, because at this level interaction effects of intelligence have not been considered.

From the two interactions already explained briefly along with the main effects, it is clear that, in the stages x intelligence x stress (A x C x D) interaction, the performance of the HI-C group is superior at all the stages of learning as compared to their LA counterparts under the same experimental condition. Performance, under stress condition has been so much debilitated
that in the early stages of learning performance of HI-S is poorer than LI-C (Table 5-7). Although in the later stages HI Ss are able to cope successfully with the stressful situation and perform better than LI groups. This shows that the effect of experimentally induced stress have been so strong that it, at times, even mitigates the influence of intelligence.

As has been already pointed out, the interpretation of these interactions cannot be considered conclusive because of the confounding element of one or the other experimental variable. For instance, in A x C x D interaction, effects of anxiety (B) have been averaged out. So it seems more reasonable to discuss the 'complete' factorial design and a 'complete' design is one in which all possible treatment combinations are administered. It has been suggested by Lindquist (1956; pp. 256-257) that if the higher order interactions prove significant, not very useful interpretations may be made of the main effects or of the lower order interactions.

The hypotheses for the present study are primarily based on the Spence-Taylor drive theory. Malmo's assumption of inverted-U theory and Spielberger's extension of drive theory to incorporate individual differences in intelligence. However, the obtained results do not seem to fit in drive theory interpretations, because in the present study ego-stress appears to have induced such higher levels of anxiety that a high-anxious subject under stress condition is more or less neurotic, crossing the optimal level of anxiety for effective performance. Therefore, instead of interpreting results in terms of drive theory predictions, more
especially the results obtained under the experimental condition of stress, these are interpreted in terms of Spielberger's extension of drive theory/inverted-U hypothesis. Malmo (1958) proposed that performance varies as an inverted-U function of physiological activation (drive). Thus, performance is assumed to increase with increasing activation up to some optimum point, after which further increases in activation hinder performance. Furthermore, an assumption by Malmo was that the optimal motivational level of the 'S' varies inversely with the difficulty of task.

Significant four factor interaction (A x B x C x D) indicates that there has been significant variance in the performance of the different groups. Table 5-8.1 presents the means for the interaction of intelligence with anxiety x stress x stages of learning interaction. It had been hypothesized that HI-HA Ss under control condition would perform better than HI-LA under the same experimental condition. Trend of means at high intelligence level (Table 8-1.a) and the corresponding figure (1.a) confirmed the expectations and very clearly show that HA Ss under control condition perform better than their LA counterparts, consistently over all the stages. Though with practice, the performance becomes almost parallel by the last stage of learning. There are no studies so far which have considered together the variables of stress, intelligence, anxiety and stages of learning as have been taken in the present study. So these findings, are not comparable with any of the previous studies, they can only be compared piecemeal.
According to Spielberger's (1966) extension of drive theory, HA facilitates performance of HI Ss as compared to LA Ss and this prediction was earlier confirmed by Denny's (1966) and Kathan's (1966) findings. Current results support these predictions derived from Spielberger's extension of drive theory, but only under the control condition (non-threatening, non-stress). Findings under stress conditions are contrary to expectations of Spielberger's extension of drive theory (Fig 1.a) but are in line with the hypothesis framed for the stress condition. As expected performance of HA Ss at HI level, under the experimental condition of stress is relatively inferior to their LA counterparts consistently at all the stages of learning. In the early stages of learning, the difference in performance is very small and it increases through the middle stages, reaching a parallel level in the later stages for both the anxiety (HA and LA) groups.

Results under the stress condition, that HA Ss are inferior to LA Ss support the emotional reactivity hypothesis (Spence, 1966). Evidently stress induced high level of activation in both HA and LA Ss leading to performance decrement, and more so in the case of HA Ss. Further, findings are in line with Malmo's theorizing, that the introduction of stressful instructions may hinder the performance of HA Ss and facilitate the performance of LA Ss under the same conditions if the points of optimum motivation are surpassed in the case of HA Ss and not surpassed in the case of LA Ss. The magnitude of difference in
the performance of LA Ss, under both the experimental conditions is not so much as it is for HA Ss (Fig 1.a). Findings are contrary to Spielberger and Smith's (1966) findings that HA Ss are initially inferior and ultimately superior to LA Ss in performance. However, in Spielberger and Smith (1966) study individual differences in intelligence were not considered.

In case of low-intelligence (Fig. 1.b), as expected, the performance of LA Ss under control condition is initially superior to HA counterparts, but ultimately inferior. HA Ss perform significantly better than LA Ss in the later stages of learning. Under the stress condition, as has been in the case of HI, results provide support to emotional reactivity hypothesis. At LI level the performance of HA and LA Ss, under experimental condition of stress, is almost similar at all the stages of learning. It is obvious from the figure (1.b) that the differences in performance of the two anxiety groups, under the experimental condition of stress and control are very large. Whereas, it is not found to be so at HI level (Fig 1.a). Moreover, debilitating effects of stress continue till the end in case of LI group because of their limited ability, but in case of HI Ss, the effects of stress are marked only in the early stages of learning. In later stages, the differences in performance decrease and performance at both the experimental conditions (stress and control) reaches a parallel level. It may be so because HI Ss have enough cognitive skills to cope with the abrupt stressful situations. Further, their performance on a
task gives them positive feedback, whereas at II level, Ss are threatened even by task-based stress and continuous negative feedback. In terms of drive theory, incorrect response tendencies are weakened sooner for HI Ss than for II Ss. However, the general expectations based on Spielberger's extension of drive theory that HA facilitates performance of HI Ss and debilitates performance of II could not be realized because these effects in the present study, are contingent upon the experimental condition under which the 'S' performs. Under the experimental condition of ego-stress HA has debilitative effects on performance of both HI and II groups as compared to their LA counterparts.

Under control condition, the findings are consistent with Spielberger's extension of drive theory and support the present hypothesis formed for performance under the control condition. It seems that relatively non-threatening experimental condition induces minimum of incorrect competing response tendencies and enable HA Ss to perform better than LA Ss, who lack drive to energize their correct responses. It is more especially so at HI at all the stages of learning (Table 5-8.1.a) than at II level (Table 5-8.1.b). At II level, HA facilitates performance only in the later stages of learning.

Under the stress condition, the findings are in line with Malmo's theorizing that performance increases with increasing drive level up to some optimum point, and further increase in drive level starts decreasing the performance. For example, Sarason (1956, 1957a, 1957b) and Spielberger and Smith (1966)
have found that stress instructions (induced by ego-involving or failure instructions) retard the performance of HA Ss relative to that of LA Ss in a serial (competitive) task. However, these studies have not considered individual differences in intelligence.

Although the task used in the present study has been of moderate difficulty and low intra-task competition, yet serial learning task has serious deficiencies (Spence and Spence, 1966). Most prominent among them is that intralist interference due to such factors as remote associations is an inherent part of serial learning (p. 301). Further, it is difficult to specify the number and strength of the response tendencies elicited by each stimulus. Serial learning task is not homogenous, and involves differential competing response tendencies.

The overall pattern of results shows that at HI level, HA Ss are superior to LA Ss under the control condition and the reverse is true under the ego-stress condition. At LI level the trend in performance is same under stress condition but slightly different under control condition, where, initially, LA Ss are superior and later a very significant reversal occur leading to better performance of HA Ss (Fig. 1.b).

Effects of stress become more conspicuous when the same interaction is examined from a different angle, i.e., interaction of stress with anxiety x intelligence x stages of learning interaction. It should be noted that in earlier studies support for the Taylor-Spence theory was obtained under conditions where Ss were given "ego-stress" instructions; that is,
identifying the serial task as an IQ test (e.g., Nicholson, 1958; Spielberger and Smith, 1966; Kathan, Durlak, and Snyder, 1971). The effects of stress, then, may be considered to have potentially important effects in verbal learning situations.

Obtained result under the experimental condition of stress are indicated in the figure (2.a) as well as in the table of means (5-8.2.a). It is clear that the performance of HI-HA Ss is impaired more as an aftermath of stress as compared to the performance of HI-LA Ss, consistently almost at all the stages of learning. Only in the last trial block the performance of both the groups reaches at a similar level. This inferior performance of HA Ss may be partially due to their hesitancy in responding correctly. Atkinson (1964) suggests that a "fear of failure" motive is reflected in measures of A-Trait, while Sarason (1960) emphasizes the special significance for high A-Trait individuals of experimental situations that arouse self-deprecatory tendencies.

Sarason (1960, pp.401-402) concludes: "...the bulk of the available findings suggests that high anxious Ss are affected more detrimentally by motivating conditions or failure reports than are Ss lower in the anxiety score distribution ...... it is interesting to note that high anxious Ss have been found to be more self-deprecatory, more self preoccupied and generally less content with themselves than Ss lower in the distribution of anxiety ...... it may well be that highly motivating or ego-involving instructions serve the function of arousing these self-oriented
tendencies. In contrast, in case of LA Ss the experimentally induced stress may evoke enough drive to energize the correct response tendencies without accompanying self-deprecatory tendencies. This may facilitate the performance of LA Ss as compared with HA Ss.

Though, in the present study, the magnitude of difference, between the performance of HA and LA at HI, is not very large, yet it is very clear that HI-LA Ss perform better than HI-HA under the experimental condition of stress (Fig 2.a). In general, the experimental literature is consistent with the hypothesis that differences in performance of high and low A-Trait individuals on learning tasks are most often found under conditions that involve failure experiences or ego-involving instructions (e.g., Spence and Spence, 1966; Denny, 1966; Spielberger, 1962; Spielberger, 1966; Spielberger and Smith, 1966; Mandler and Sarason, 1952). The present findings under stress condition are more in line with Malmo's theorizing than with Spielberger's extension of drive theory. According to Malmo's theorizing the introduction of stressful instructions may hinder the performance of HA Ss and facilitate the performance of LA Ss, under the same conditions. These effects are much greater on a difficult task. Findings are also consistent with Atkinson's suggestion that fear of failure is a major characteristic of HA Ss and with Sarason's conclusion that ego-involving instructions are more detrimental to the performance of HA Ss than LA Ss. Comparison of performance at different stages of
learning has presented the trends in learning more vividly. Under stress condition (Table 5-8.2.a), in the early stages of learning as expected, according to Malmo's assumptions, performance of HA Ss at both the levels of intelligence, more especially at HI level has been inferior to that of LA Ss. The extent of difference increases as learning proceeds through the middle stages. At the last stage performance of HI-HA and HI-LA is parallel.

Under stress, at low intelligence level, the performance of two anxiety groups is comparable (Table 5-8.2.a) Fig. 2-a) whereas, according to the predictions LA Ss were expected to perform better than HA Ss, as has been reported earlier by Catalana and Kirkpatrick (1968), Spielberger and Smith (1966) and many other studies. But in these studies intelligence level of the Ss was not taken into account. In the present study, the Ss are, by and large, all naive, not at all familiar with any experimental situation. For them ego-stress instructions induce heightened emotionality irrespective of HA and LA Ss especially at LI level. Therefore, performance of both the groups is impaired almost equally by ego-stress instructions. In terms of drive theory, in a serial learning task, in which there is inherent intra-task competition, the incorrect response tendencies dominate over the correct ones. Thus, with limited ability and heightened drive due to the stress instructions, it becomes difficult for the Ss to learn the correct responses. Further, while it is expected that
high anxious (HA) Ss perceive most of the situations with heightened activation, it is quite likely that low anxious (LA) Ss who lack the requisite skills and experience to do well on a task perceive the situation as threatening, especially under ego-involving instructions. Situations which imply evaluation tend to induce higher level of drive even in otherwise LA Ss and particularly so at LI level.

Like at high intelligence level, performance of HA and LA groups at LI level too becomes parallel by the last stage. But the magnitude of difference is greater at HI level than at LI, under the experimental condition of stress. There is evidence that HA starts facilitating performance in later stages (Spielberger and Smith, 1966) as with practice incorrect response tendencies are eliminated.

In the present case, HI Ss could learn the serial learning list completely at both the levels of anxiety, therefore, at the last stage performance is comparable. LI group, on average, is not able to learn the list of syllables completely. At LI even LA Ss tend to feel threatened because of their inadequacy and inferiority feelings. Experimentally-induced failure effect the performance as adversely in verbal task as does anxiety (Sears, 1937) and it seems to be more so when Ss of LI are involved under ego-threatening instructions. Ss tend to make more errors on serial verbal learning of nonsense syllables immediately after being told that they had failed than those who are not told so (cf. Wangu, 1973).
The obtained results, especially those indicating performance of LA Ss either parallel or inferior to HA Ss, suggest that it is imperative to take account of the anxiety which is aroused in an experimental situation, rather than measuring it much earlier under relatively nonthreatening, pleasant conditions. Spielberger has emphasised the importance of measuring drive level during or immediately after the performance.

Under control condition, the trend of means is almost reversed from that of under experimental condition of stress and support the present hypothesis. HI-HA Ss consistently perform better than HI-LA Ss at all the stages of learning. The magnitude of difference is large in the early stages of learning and in the later stages (from fourth trial block) performance of both the groups becomes almost parallel (Table 5-8.2.b and figure 2-b). However, at LI level, HA Ss are initially inferior to that of LA counterparts, but eventually gain superiority over LA Ss. This trend of results support previous findings, (e.g. Ramond, 1953; Spence, Farber, and McParn, 1956; Standish and Champion, 1960; Salso, 1968).

Accordingly, HA Ss are expected to be initially inferior to LA Ss where incorrect responses are initially dominant, followed by superior performance of HA Ss at the point in learning where correct responses attain dominance in the response hierarchy. These predictions imply an interaction between level of performance and anxiety (D) level in learning tasks involving initially strong competing responses, as is the case in present
study. Further, HA, in the course of learning, energize correct response tendencies sooner for HI Ss and little later for LI Ss too. It is obvious that anxiety does facilitate, if the conditions under which performance takes place do not impose any serious negative feedback, and instead, are mild. The trends in performance under control condition are generally consistent with Spielberger's (1966) extension of drive theory, and the results of Gaudry and Spielberger (1970, easy task) and Katahn, Durlak, and Snyder, 1971.

The results of other studies comparing the performance of HA and LA Ss in serial learning under nonstress conditions have been equivocal (Deese, Lazarus, and Keenan, 1953; Kalish, Garmezy, Rodnick and Eleke, 1958). These studies did not analyze the data with respect to serial position and/or stage of learning and must be considered to be confounded because of the opposite effects of anxiety on items in the middle versus the beginning or ends of the lists (Spielberger and Smith, 1966).

When the anxiety interaction is examined with the intelligence, stress, and stages of learning interaction, it makes clear the earlier explanations that HI-HA perform better under control condition than their low intelligence (LI-HA) counterparts under the same experimental condition (Table 8-3.a; Fig.3-a). Similarly HI-HA Ss are superior to their LI (LI-HA) counterparts under the experimental condition of stress (Fig 3-a). Performance has been so much impaired by the experimental condition of stress that performance of HI-S is inferior to LI-C, in the early stages of learning. Although in the later stages...
it gains superiority over LI groups. Findings, in the present study under the experimental condition of stress, are consistent with Malmo's hypothesis that performance varies as an inverted-U function of physiological activation (drive). Earlier studies which found results consistent with the inverted-U hypothesis are Sarason, 1961; Neuringer and Orwick, 1968; Gerrish, 1966; Young and Brown, 1973.

There is difference in the performance of both the anxiety groups (HA and LA) at HI level, under the experimental condition of stress, with HI-LA being superior at all the stages of learning. Performance of LI group, at both the anxiety levels, is most detrimentally affected by the stress instructions (Table 5-8.3, Fig. 3-b). Performance of LI group under stress condition shows difference in performance not so much attributable to drive level, as much to the experimental conditions. It is revealed by the comparable mean number of correct responses at HA and LA levels by different intelligence and experimental condition groups, more especially at LI level (Table 5-8.3). Stress instructions induced enough drive even in LA Ss to produce interfering effects on performance.

However, at LA level the intelligence differences are more marked (Fig 3-b) than at HA level (Fig 3-a). Conversely, performance of HI-HA, under control condition is better than HI-LA counterparts. Similarly, performance of LI-HA is better than LI-LA under control condition, in the later stages of learning. The findings under control condition
support extension of drive theory contentions. Similar findings were reported by Denny, 1966; Spielberger and Smith, 1966; Katahn, et al., 1971, etc.

Viewed within the context of drive theory, the observation that HA facilitates the performance of bright Ss under relatively non-threatening experimental conditions and leads to performance decrements for the same intelligence level under the experimental conditions of stress. It suggests that experimental condition of stress may be an inverse function of intelligence. For high intelligence Ss, a given learning task may elicit only correct responses if the experimental conditions are non-threatening, whereas the same task may evoke a large number of strong competing tendencies if the Ss are working under stressful conditions. Denny (1966) demonstrated that while the performance of HI-HA Ss was superior to that of HI-LA Ss, the performance of LI-HA Ss was inferior to that of LI-LA Ss on the same task, stress was not considered as an independent variable. In the present study an attempt was made to reduce task-based stress by making the Ss learn on a practice list. However, it seems especially important to take individual differences in intelligence into account when deriving predictions from drive theory concerning the performance on complex learning task.

On the basis of the findings of the present study, it may be concluded that the performance of HA and LA Ss reflect differences in drive level only, where experimental conditions contain some degree of stress supporting Spence's emotional
reactivity hypothesis. Stress induced high levels of drive in both HA and LA Ss. It might have been due to the fact that the Ss in the present study were all naive, who never had any familiarity or experience with laboratory learning. Further, they were all girls in the (age range 13 to 15 years) adolescence age group where anxiety is thought to be at the peak. Generally girls in Indian culture are more self-conscious and sensitive to praise and blame. Moreover because of cultural expectations, students assumed that they were supposed to do well and the instructions that they were not doing very well induced anxiety even in otherwise low anxious Ss. Besides the stress instructions, LI Ss receive failure feedback from the task also, especially in the beginning when there are more incorrect response tendencies, which further impair the performance of both HA and LA Ss.

The important reason for the performance decrement due to stress might also have been the nature of task, since the serial verbal learning list consisted on nonsense syllables (Appendix 2). Although serial learning has disadvantages over other verbal learning paradigms, it has a few disadvantages too. For instance, because of its being meaningless in nature, it is difficult to establish strength of S-R tendencies hierarchically. Task difficulty is a variable of great importance, since performance, by and large, is a function of nature and difficulty level of the task. Wolfgang, Pishkin, and Lundy (1962) reported that anxiety did not have any appropriate effect on performance, whereas task difficulty proved to be an important variable affecting performance. The Taylor-Spence theory and Malmo's
formulation predict that performance will pay vary inversely with task difficulty when difficulty is defined in terms of degree of intratask response competition. This manipulation of difficulty in tasks which may be considered to involve competing responses (e.g., serial learning task) have yielded promising results (e.g., Saltz and Hoehn, 1957; Sarason, 1956, 1957a, 1957b). But none of these studies considered the possible interaction of stage of practice with anxiety and task difficulty.

Further, intralist interference due to remote associations can not be avoided. Due to these reasons response tendencies vary within the list. Hence, performance of experimental groups is differentially influenced by these competing and noncompeting tendencies within the task, suggesting that performance of tasks such as serial learning is a function of serial position of syllables. There are, in fact, as stated earlier, a very few studies to date that considered serial position effects in serial learning studies. Stage of practice and serial position do interact with the above mentioned variables. Yet these have not been taken into account in studies involving serial position.

6-2 Interactive Effects of Anxiety (A-State) Intelligence, and Stages of Learning on Serial Verbal Learning:

In the present study experimental condition of ego-stress aroused high level of anxiety even in LA Ss. A highly significant rpb (r -.60) between stress and A-State suggested that these two variables may not be considered separately while
interpreting A-State results. In this study they are reflecting more or less the same phenomena. Martens (1971) and Carron (1971) have suggested that stress and A-State are synonymous. Although it does not seem to be very appealing theoretically, because "stress and state anxiety reflect a fundamental distinction between the properties of anxiety as an emotional reaction (A-State) and the stimuli that evoke this reaction (stressors)", (Spielberger, 1972, p.488). For practical purposes, supported by statistical logic, the variable of stress has been eschewed in A-State analysis.

Analysis with A-State scores provides significant main effects of anxiety as well as intelligence and significant interaction between anxiety and intelligence (Table 5-9). Trend of means (Table 5-10) on the whole indicates that LA Ss as compared to HA Ss and HI Ss as compared to LI Ss, obtained more correct-responses. It is also revealed that anxiety differences are more clear when intelligence is taken into account (Table 5-11).

The significant main effect of stages (Table 5-9) and the corresponding means (Table 5-12) show that the performance varied from one block to the other, authenticating the importance of analysing learning by stages. It is clear that due to practice number of incorrect response tendencies are eliminated and gradually correct responses start dominating, sooner for HI Ss than for LI Ss. LA (A-State) Ss performed better than HA Ss consistently over all the stages (Table 5-12) although at this level effects of intelligence are confounded. There has been significant increase in A-State scores from that of A-Trait as a result of
ego-stress. In high A-Trait group (Table 4-2) mean number of anxiety scores 47.0, with SD of 5.9, for HI-HA group and 49.0 with SD 4.29 for LI-HA group (Table 4-2). According to the norms for American high school students (Spielberger, Gorsuch, and Lushene, 1969 p. 12) level of anxiety is above 75th percentile (norms for Indian students are not available). Whereas, in high A-State, the level of anxiety falls above 95th percentile, with mean score of 63.3 and SD 5.05 for HI-HA group and mean score 63.8 with SD 9.8 for LI-HA group (Table 4-4). Although anxiety in high A-Trait groups is very high, yet in high A-State groups is very high, yet in high A-State groups it's so high that it almost becomes a pathological phenomenon. Obviously at such high levels of anxiety it can not be expected that anxiety would facilitate performance.

The obtained results are not interpreted in terms of drive theory predictions, because while drive theory predicts facilitative effects of HA, the level of anxiety is more or less moderate than being extremely high as has been in the present study. Like A-Trait results, for A-State too it is considered more appropriate, in the light of level of anxiety, to consider Malmo's assumptions. Drive level beyond the optimal effective level is apt to have debilitating effects on performance.

As is obvious, HI Ss always tend to perform better than LI Ss. Spielberger (1966) suggested that task difficulty is a function of Ss' intellectual level. Thus, a task of moderate difficulty elicits lesser incorrect competing responses for
HI Ss than for LI Ss. The present results show that magnitude of difference in the performance of HI and LI groups is small and it increases as the learning proceeds (Table 5-12.b). HI group learned the task to criterion, whereas LI group, owing to its limited ability could not completely learn it. It is in line with Spielberger's contentions that task difficulty is a function of Ss' intellectual level besides the inherent difficulty of the task.

According to Spielberger's (1966) extension of drive theory, it is expected that performance on a moderate difficulty task, of HI Ss should be favoured by HA and that of LI Ss should be inhibited by HA. The findings of the present study involving HI group are contrary to the predictions of the theory (Table 5-13), negating also the previous findings of Denny (1966) and Katahn (1966) on concept formation and serial maze learning tasks. It primarily is due to the reason that in the A-State sample, high anxious Ss' level of anxiety is pathologically high. As has been explained earlier that performance varies as an inverted-U function of physiological activation. Thus, performance is assumed to increase with increasing activation up to some optimum point, after which further increases in activation hinder performance.

It is clearly revealed by the figure (Fig-4) that performance of HI-LA has been uniformly better than HI-HA group at all the stages of learning. Obviously anxiety beyond the optimum effective level is detrimental for performance and the studies (e.g., Neuringer and Orwick, 1968; Gerrish, 1966; Young and Brown, 1973) which
have reported high drive facilitating performance of HI group, differ in the level of anxiety or drive. Further, as is stated in A-Trait results that Ss in the present study were naive, absolutely unfamiliar with laboratory learning and girls in the adolescent age-group. All these factors were heightened by the nature of serial verbal learning task. Whether a particular individual shows elevation in A-State in a specific situation largely depends upon the extent to which he perceives the situation as dangerous or threatening and this, further, is greatly influenced by past experience. The learning task being very new to the Ss, aroused high levels of A-State, which tend to interfere in learning the correct response, even at HI level. It was hypothesized that HA would be detrimental for performance and the findings have supported this hypothesis. Further, it was expected that LA (A-State) would facilitate performance as in case of LA Ss the level of ANS arousal is enough to act as an energizer, thereby, facilitating performance of HI Ss.

At low intelligence level, findings are in line with the hypothesis that HA at this level would be inhibiting performance. It is revealed by means (Table 5-13) that over all the stages LA Ss performed better than HA Ss. In A-Trait analysis it is found that at low intelligence level performance of HA and LA groups is not very different. In A-State analysis anxiety has differential effects on learning. It may be due to the fact that, though the categorization remains as high anxious and low anxious, yet the degree of anxiety differs. Whereas in
A-trait analysis mean score of HA Ss is nearly 52.0, it is considerably higher in A-State (69 or above). Similarly for LA Ss the mean score in A-trait analysis is 37.4 and in A-State it is 32.5. Obviously, the difference between HA and LA groups is larger in A-State than in A-trait groups. Therefore, the resulting distinct performance of anxiety groups in A-state analysis, especially at LI level. At LI, the performance is also limited by the ability of the Ss. Further, the findings indicate the benefit of taking A-state measures. LI-HA performed significantly poorly than LI-LA Ss (fig.4) and the magnitude of difference is very large at all the stages.

Obtained results endorse the use of A-State measures in studies dealing with effects of anxiety and ego-stress instructions. Anxiety must be aroused to be effective. Findings reported above suggest that its imperative to take into account the nature and magnitude of situational stress by making effective measurements of the aroused drive in an experimental situation. Analysis by stages imply that its important to specify the relative strength of correct-responses and competing error tendencies, evoked by a learning task. Obtained results are more in line with Malmo's theorizing and also provide additional support to Spielberger's extension of drive theory to incorporate individual differences in intelligence.

Results obtained in A-trait analysis for serial learning are not comparable with those obtained in A-state, for two reasons: level of anxiety (HA and LA) is not comparable in A-trait and A-State; a very significant chi-square (14.02)
indicated that many LA (A-trait) Ss obtained high scores on A-State and vice-versa. Hence, the groups formed in A-trait and A-state are not comparable.

6-3 The Effects of Anxiety (A-Trait), Psychological Stress, Intelligence, and Serial Position on Serial Verbal Learning:

It can be stated unequivocally that serial lists do involve competing responses and that the competition effects are stronger in the middle than at the beginning or at the end of the list. While the theoretical explanation of the type of competition differ (e.g., Young, 1962), the greater competition effects in the middle of the list provide the primary explanation for the classical serial position curve (e.g., McCrary and Hunter, 1953).

The data, in the present study, provide a usual bow shaped serial position curve (Table 5-14:5:15). Words in the serial position 1, 2, 3, and 12 individually elicited largest number of correct responses and words in the serial position 5, 6, 8, and 9 elicited the fewest number of correct responses. Accordingly, they are designated as 'easy' and 'hard' words. Since competition effects are greater for the middle items in a serial list, it is appropriate to analyze data for these items separately.

Following Kalish et al (1958) and Spielberger and Smith (1966) findings it was expected that the facilitative effects of HA would occur in learning for words at the extremes of the list than for the words embedded in it. These facilitative effects would be more pronounced for HI-HA Ss than for LI-HA Ss. Further,
these effects would depend upon the experimental condition under which the Ss were performing.

Contrary to expectations on both 'easy' and 'hard' words, high and low anxious Ss perform equally good.

Assuming anxiety to have drive properties, an increase in anxiety should be accompanied by augmentation of all response tendencies. The stronger tendencies, correct or incorrect, show relatively greater augmentation, in strength or frequency than weaker ones. Analysis of 'hard' and 'easy' words (Table 5-16) indicate that there is significant difference in the number of correct-responses obtained for 'hard' and 'easy' words. This suggests that serial learning results remain misleading unless serial position effects are explored. Kuno (1965) and Spielberger and Smith (1966) found greater competitive effects in the middle of a serial list and it is so in the present study too. By and large, obtained results for 'hard' and 'easy' parts of the list confirm that within a serial learning list, competitive and noncompetitive tendencies vary according to the serial position of a particular word.

So far the anxiety effects are concerned the results do not support drive theory predictions. There are many studies which can be quoted here as not supporting the drive theory (e.g., Hughes, Sprague, and Bendig, 1954; Saltz and Hoehen, 1957; Wolfgang et al 1962; Bryan and Loder, 1962; Dunn, 1968; Lott and Lott, 1968; Thayer and Cox, 1968; Walker et al, 1970). It has been expected that on 'easy' parts of the list HA Ss would perform better
even at LI, whereas, on 'hard' parts HA Ss would perform better only at HI level. Obtained results indicate no noticeable difference in the performance of these two groups.

Wherever anxiety is involved interactions are not significant. Anxiety has come out to be an inconsequential variable in this analysis. In serial position analysis of serial learning most of the interactions are nonsignificant (Table 5-16). It may be due to the reason that size of task reduced from 12 syllables to 8 syllables and further these 8 syllables constituted both 'easy' and 'hard' task (4 syllables each).

As has been already stated Spielberger and Smith (1966) have been the only investigators to conduct such an analysis and reported some support for drive theory. These investigators analysed the performance of HA and LA Ss during the course of learning for 'easy' words and 'hard' words, on a list of medium difficulty. They found that the performance of HA Ss was superior to that of LA Ss on the 'easy' words throughout learning. For the 'hard' words, however, the HA Ss were initially inferior to LA Ss, but the HA Ss improved during the course of learning and were superior later in the learning task. These findings were obtained only under the stress condition.

In the present study, intelligence and stress have produced differences in performance in the expected direction. They prove significant factors in serial position (Table 5-17). On the 'easy' parts of the list there are no significant differences
in the intelligence groups, but on the hard parts, HI Ss perform significantly better than LI Ss. Spielberger (1966) suggested that a task of moderate difficulty evolves lesser number of error tendencies for HI than for LI Ss. For 'both' easy and 'hard' parts of the list, the experimental condition of stress has proved detrimental. Performance of Ss under the control condition is significantly better than their counterparts in the stress condition (Table 5-17). These findings are consistent with the findings of serial verbal learning complete task. The experimental conditions have proved to be very important factors in a learning situation.

Although most of higher-order, the interactions are nonsignificant, the trends in learning (not shown in tabular form) indicate that for 'hard' words HA Ss perform better than HA Ss at both the intelligence levels, under the stress condition. Trends are in line with drive theory predictions for difficult task. Under the control condition, results reflect that HA facilitates performance of HI, irrespective of the 'easy' or 'hard' parts of the list. Though results do not reach statistical significance, trends are consistent with the results obtained on the complete serial learning task and somewhat consistent with Spielberger and Smith's (1966) findings. In Spielberger and Smith's study individual differences in intelligence were not considered and Ss were of high aptitude. In the present study, for serial position analysis, stages of learning have not been considered. In fact, findings can not be compared with Spielberger and Smith's findings due to the above mentioned
The gist of the present findings is that for HI group, drive level or experimental conditions may not be as important as they are for LI Ss. Besides providing additional evidence that difficulty level in a serial task is determined by serial position of the syllables and that response tendencies change as a function of intra-task competition, the serial position analysis has not revealed anything else.

Another study patterned after the analyses of Spielberger and Smith (1966) is that of Katahn, et al (1971). They reported significant main effects of word difficulty and trial blocks, but the interactions with anxiety were not significant, though with intelligence they were significant. (No very important conclusions can be drawn on the basis of these findings).

One very important conclusion that follows is that serial learning task is not homogenous. This factor about the nature of the task places limitations on the earlier interpretations of serial learning complete task, because rate of learning for 'hard' and 'easy' words, taken out of the same list is different. It is further confounding the other factors. Stress effects depend upon the difficulty level of the task. Since competition effects are stronger in the middle than at the beginning or at the end of a serial list, it is appropriate to analyze the data for these separately.

The inconsistencies found in the present results can be attributed to the analysis being based on anxiety scores measured...
much before the performance itself. If the same results are explored with the regrouped anxiety (A-State) Ss, results may find relevance in the predictions of drive theory and further in State-trait theory of anxiety.

6-4 **Interactive Effects of Anxiety (A-State), Intelligence and Serial Position on Serial Verbal Learning**

Words at different serial position elicited varying responses from various groups. All the main effects and most of the interactions are significant in the analysis of serial position (Table 5-18). Words designated as 'hard' elicited fewer correct-responses as compared to 'easy' words (Table 5-19). It proves that words have been rightly designated as 'hard' and 'easy'. Further, that task competencies do change as a result of practice as well as due to the position of a particular word in a serial learning list.

Although task by anxiety interaction shown in table 5-19 do not reach statistical significance, the trends indicate that on both the tasks (easy and hard) LA Ss obtained significantly more correct-responses than their HA counterparts. The magnitude of difference is more for 'hard' words than for 'easy' words. It may be because HA Ss tend to withhold responses for fear of being wrong and it adds into their errors. LA Ss temperamentally are less apprehensive and start giving responses from the beginning only (a fact noted from raw data), therefore they obtain more correct responses. Of course, with practice even HA Ss gain confidence and their anxiety stops interfering in the learning of correct responses. However, the results do not support drive
theory predictions. They are consistent with Malm's assumptions. HA Ss are more deleteriously affected by unfamiliar situations and they tend to perform relatively poorly on various types of tests (Phillips, 1972; Sarason, 1960). HA Ss (test anxious) are not deficient in intellectual wherewithal; rather, the problem seems to be that they exaggerate and personalize inordinately the threat of evaluation that is inherent in a given situation (Mandler and Sarason, S.B., 1952; Sarason, 1955, 1957; Sarason and Minard, 1962; Watson and Friend, 1969). In the present study effects of anxiety are more deleterious for the difficult part of the list. Evidently HA interfere in the learning of complex task as, besides and because of the other reasons, such a task elicits many incorrect response tendencies. However, at this level no conclusion can be drawn, as effects of intelligence are averaged over here.

Results pertaining to the effect of intelligence are in the expected direction. HI Ss perform better than LI Ss on both the 'easy' and 'hard' parts of the serial learning task (Table 5-19). Mean number of correct-responses indicate that magnitude of difference is significantly large in case of 'hard' words than for 'easy' words, between the two intelligence levels. Obviously, on 'easy' parts of the list even LI Ss could manage to do somewhat better than they could on the 'hard' parts of the list. In terms of drive theory the middle items, i.e, the 'hard' parts of the list elicits more incorrect competing response tendencies. In case of LI Ss this functions as a task based
stress and leads to poorer performance. Besides LI Ss are incapacitated by their limited ability too.

Interaction between task, anxiety, and intelligence is not significant (A x B x C). However, findings do indicate that level of ANS arousal in an experimental situation is more relevant to interpret anxiety effects. This is consistent with the results obtained with trait anxiety. It may be due to the reduction in the size of the task. State anxiety analysis, involving serial position effects, has not revealed anything new, just like trait anxiety analysis. In the serial position analysis stages of learning have not been taken into account, so it can not be concluded that rate of learning, for both the 'easy' and 'hard' parts of the list, differ at different stages of learning and for different anxiety and intelligence groups. The findings are not comparable with any earlier studies.

6-5 Effects of Anxiety (A-Trait, Psychological Stress, Intelligence, and Stages of Learning on Paired-Associate Learning:

A paired associate (PA) list of moderate difficulty level (non-difficult, competitive) has been used in which response competition has been varied. List contained pairs initially highly associated in natural language, but re-paired in order to maximize response competition. Underwood and Schulz (1960) suggested that response competition and task difficulty are different variables and should be used as such. The Taylor-Spence theory and Malmo's formulations predict that performance will vary inversely with task difficulty, when difficulty is defined in terms of intra-task response-competition.
On the basis of Drive theory it has been predicted that HA groups would be poorer in performance than LA groups, especially when the initial habit strength of the response item paired with a given stimulus is weaker than the strength of one or more competing response tendencies. Obtained results provided nonsignificant anxiety effects (Table 5-20). Contrary to predictions, trend of means (Table 5-21) reveals that performance of LA Ss is retarded relative to that of HA Ss. Hogan (1971) reported no significant difference in the performance of anxiety groups on medium difficulty task, but stages of learning were not considered. In the present study, on the whole, the PA task appears to have proved relatively easy for most of the Ss although it was initially designed to be of moderate difficulty level (Appendix 3). This is revealed by an observation that mean number of trials for each S has been only 12.0, whereas, the maximum limit of trials was 25.0. As compared to mean number of serial learning trials (17.4) the difference seems to be quite significant.

Accordingly the modest evidence support the predictions derived from drive theory, for easy tasks, i.e., that HA Ss learn simple tasks faster than LA Ss. Results obtained by Taylor and Chapman (1955) indicated that the superiority of performance of HA Ss is not confirmed exclusively to nonverbal situations. They, further, support the position that amount of response competition is relevant factor in determining the interaction between anxiety level and performance. The results that anxiety facilitates learning on easy tasks support the findings of Waite (1959);
Sarason, and Palo la (1960); Ruebusch (1960); Sarason, (1956) and many other investigators. In a more recent study conducted in India Verma (1973) reported the same results, working under the theoretical framework of test anxiety.

The hypothesis that performance of HA Ss would be inferior in the early stages of learning and relatively superior in later stages as compared to LA counterparts, has not been supported. There is significant interaction between stages and anxiety (Table 5-20). Trend of means (Table 5-25) reveals that HA Ss have been superior in performance in the initial stages and in the last stages performance of both the anxiety groups is parallel.

In a paired-associate task where response competition is minimized, HA Ss should be superior to LA Ss because of the facilitative effects of drive in the early stages and identical in the later stages because habits related to association or response learning are above threshold (Goulet, 1968). The prediction that high and low anxious Ss perform differentially has not been supported by many previous studies too, on both easy and difficult lists (Harleston, 1963; Harleston and Cunningham, 1961; L’Abate, 1959; Levitt and Goss, 1961).

With lists such as the one used in present study, the interfering effects related to associative competition are mixed up with facilitative effects relating to response learning. Therefore, the obtained results fail to support drive theory predictions. The results pertaining to studies of this nature have been equivocal (Besch, 1959; Lovaas, 1960).
Interaction between stages and intelligence is significant. HI Ss perform consistently better than LI at all the stages of learning (Table 5-25). As the learning trials increase, magnitude of difference between the two intelligence groups decreases. In later trials performance of HI and LI reaches a parallel point. This signifies that task proved to be relatively easy for both the intelligence groups. This is indicated by the mean number of trials also (already given). With practice even the LI group could master the task.

Effects of psychological stress are also significant. Ss under the ego-stress condition perform significantly poorly almost at all the stages of learning (Table 5-25). Stress caused impairment in learning but the difference in performance under both the experimental conditions is not so much as it was in serial verbal learning (Table 5-5) especially in later stages of learning.

Nature of paired-associate task is different from serial learning task. Analysis of paired-associate learning into two functional stages has been suggested by some experimental psychologists (e.g., Underwood, Runquist, and Schulz, 1959; Underwood and Schulz, 1960). The stages of paired-associate learning were designated a response learning stage and an associative stage. The response learning stage involves integrating the specific responses as units, while the associative stage relates to the 'hooking up' of stimuli and responses in the list. The stage analysis leads to the inference that any deleterious effects
of response competition in a verbal task must be localized in the associative stage (Underwood et al., 1959). In a paired-associate task where response competition is absent or minimized, HA Ss should be superior to LA Ss because of the facilitative

drive on both stages of learning.

Interaction between anxiety, intelligence, and stages of learning is not significant. However, trends in learning reveals (Table 5-26), contrary to predictions, that on the whole HI-LA perform better than HI-HA Ss. Goulet and Mazzei (1969) found that HA Ss learned more slowly, irrespective of stimulus similarity. They suggested that deleterious effects on performance of HA Ss may be due to their withholding responses. Sarason (1956, 1957) had earlier suggested that poor performance of HA Ss may be poor because of their exaggerating and personalizing any situation that they consider is evaluative in nature.

In contrast, at LI level HA Ss perform slightly better than LA Ss consistently over all the stages (Table 5-26). Trend is consistent with the assumption that learning task generate few competing response tendencies for HI Ss than for LI Ss. Correct response becomes dominant earlier in learning for HI Ss than for LI Ss. Harleston (1963) reported better performance of LI-LA Ss especially, early in learning as compared to their HA counterparts on easy task. In later stages HA Ss performed better than LA Ss. Findings at LI Ss are neither in line with drive theory predictions nor with Gaudry and Spielberger's (1970) findings. However, the differences in performance of HI and LI groups at both the anxiety
levels are not significant. Further, stress effects have not been considered at this level.

Literature has supported the hypothesis that performance of HA Ss under stress is impaired more significantly as compared to performance under relatively non-threatening conditions (e.g., Deese, Lazarus, and Kemen, 1953; Beam, 1955; Kalish, Garmezy, Rodnick, and Blake, 1958; Singh, 1967; Katahn and Pagano, 1965, etc.). Impairment in performance is predicted as a function of stress on the assumption that it serves to increase anxiety states in an experimental situation and more so in the anxiety-prone subjects. There is some evidence to the contrary too (e.g., Peltonen, 1970; Charlotte, 1961, etc.). Charlotte had concluded that anxiety is chronic in nature.

In the present study, there is significant interaction between anxiety, stress, and stages of learning. The difference in performance is consistent over all the stages for both the anxiety groups, under both the experimental conditions (Table 5-27). The trend in means reveals that difference in performance is more attributable to experimental condition of stress than to the level of drive. Significant interaction suggests that increased drive level results from the fact that high anxious Ss react more to stressful stimuli than do low-anxious Ss. It is revealed by the mean number of correct responses that under stress condition LA Ss perform slightly better than HA Ss in the early stages of learning and in later stages trends slightly reverse and HA Ss are better in their performance than LA Ss.
Stress condition has the effect of interfering in the performance, relatively more strongly for the HA Ss. The major effect of stress proves to be that of evoking differential levels of anxiety, which in turn induces incorrect response tendencies, leading to interference in efficient response. This is consistent with the viewpoint that anxiety is reactive in nature (e.g., Spielberger and Smith, 1966; Katlin, 1964, 1965; Hodges and Spielberger, 1966; etc.).

Under no-stress (control) condition HA Ss perform consistently better than LA Ss. Findings support the hypothesis that HA Ss tend to perform better under relatively nonthreatening conditions. Further they support the drive theory predictions. For LA Ss performance is impaired because they initially lack the drive to perform and when the experimental situation does not command any threat, they would not be aroused to action. Since in the present study, Spence's emotional reactivity hypothesis has been extensively supported, it explains the poor performance of LA Ss under control condition. Denny (1966) and Forbes (1969) have shown that stress and anxiety have debilitating effects on learning using different learning tasks.

Obtained results denote that predictions of drive theory held under psychological stress instructions and situations where HA Ss, dependency needs are not gratified. The effects of stress in verbal learning tasks provide suggestive evidence that anxiety level reflects Ss' susceptibility to react to situational stress-factors.
In paired-associate learning it is expected that HA groups will be poorer in performance than LA groups when the initial habit strength of the response term paired with a given stimulus is weaker than the strength of one or more competing response tendencies. In paired-associate list, some of the S-R pairs have a high initial associative connection while others have a minimal associative connection. Techniques have been devised to provide separate measures of the response-learning and associative stages in paired-associate task (Jung, 1965; Postman, 1962; Underwood et al., 1959). The use of these techniques may permit the more complete understanding of the interaction among anxiety, difficulty of response learning and response similarity. However, so far response learning for HA and LA Ss is concerned, there is need for further research. The present findings indicate that effects of drive are contingent upon the experimental conditions besides the difficulty level of the task.

Combined effects of intelligence, stress, and stages of learning (A x C x D) are significant. Trend of means (Table 5-28) and the corresponding figure (Fig-6) indicate that HI Ss under control condition perform significantly better than their counterparts in stress condition, consistently over all the stages of learning. Stress effects are so marked in the present study that performance of HI-S group is comparable with HI-C group. Unlike serial learning, in paired-associate learning task stress effects cease to have any important effect on performance of different intelligence groups. In later stages performance of
all the groups is comparable. Since paired-associate task was meaningful in nature and proved easy for most of the Ss, by the later stages all the Ss could learn the list completely. Accordingly, instead of considering fourth or fifth trial block to be later stages, it seems more appropriate to consider third stage to be last stage of learning.

Stress condition by evoking higher levels of drive, incapacitated even HI Ss. However, stress effects are more pronounced at LI level. HI Ss perform better than LI under stress condition. Presumably HI Ss have requisite skills to cope with sudden stressful situations. They can assess the inherent danger in the situation more adequately than LI Ss, because LI Ss, especially under stress have a limited perceptual field, therefore their learning is hampered. Since the learning task has been no challenge to the ability of Ss with HI, they do not find the situation as threatening as their LI counterparts. One thing that is clear from the present findings is that stress and intelligence variables proved very effective and performance, on paired-associate learning task is more influenced by these two than any other factor. Stages of learning too are important to be considered.

In the paired-associate learning list associative competition was varied by re-pairing the highly associated S-R items. Other investigators that have used lists of natural language re-paired the items in an attempt to maximize response competition (e.g., Besch, 1959; Spence, Farber, and McFann, 1956;
Spence, Taylor and Ketchel, 1956). With such lists, the interfering effects (associative competition) are again confounded with facilitative effects relating to response learning. However, there is no simple way of partialing out these opposing effects, nor of estimating the resultant variance attributable to each stage. As may be expected, the results relating to studies of this nature have been far from unequivocal (Besch, 1959; Lovaas, 1966), although some evidence is available supporting the Taylor-Spence theory (Spence, Farber, and McFann, 1956; Spence, Taylor, and Ketchel, 1956).

In paired-associate analysis, four factor interaction is not significant. This may be attributed to the fact that Ss in all the groups under all the conditions could manage to learn the PA list completely in fewer than criterion trials. In later stages of learning performance of all the groups is comparable and there is no variance.

Results obtained with PA learning task as such are not comparable with SL results because PA task proved to be relatively easy or somewhere between easy to moderate for most of the Ss whereas SL was from moderate to difficult. PA list is meaningful and its content is probably highly correlated with the intelligence test used in the present study. Further, task-based stress, which is inherent in a learning situation is different in PA and SL tasks, because the former is meaningful and latter is relatively meaningless.
Effects of Anxiety (A-State) and Intelligence on Paired-Associate Learning

It has been hypothesized that A-State scores are better predictors of performance than the A-trait scores. Present findings support the hypothesis. Main effect of anxiety in A-State analysis is significant at higher level that it has been in A-trait analysis (Table 5-29). A-state scores have yielded significant anxiety effects. As expected performance of HA Ss is significantly poorer than LA Ss (Table 5-32) over all the stages, whereas in A-trait analysis it was the contrary (Table 5-25). In the early stages of learning performance of HA Ss is inferior to LA counterparts and in the later stages performance of both the groups is identical. Whether or not anxiety interferes with learning depends upon the perception and interpretation of the situation as threatening or non-threatening by the Ss.

Both Trait-State Anxiety Theory and Test Anxiety Theory assume that test-like situations evoke emotional reactions and task-irrelevant responses, more so in the anxiety prone Ss. Trait-State Anxiety Theory predicts that persons who are high in A-trait are more prone to experience greater emotionality in testing situations than persons low in A-trait. HA Ss have tendencies to make more incorrect responses due to ruminative thoughts, i.e., worrying, being self-derogatory or engaging in social competition (Child, 1954; Mandler and Sarason, 1952). Further, Trait-State Anxiety Theory attributes the performance decrements of anxious persons to the activation of strong error tendencies by the high drive levels that are associated with elevations in A-state.
Another reason for the poor performance of anxiety Ss may be their being very cautious. With increased anxiety there is greater cautiousness (Ruebush, 1980) in the interest of ego-defense. There is also a tendency in HA Ss to withhold responses till they are confident, and withholding responses is equal to making an incorrect response.

As compared to A-trait results, A-state findings have led to significant results. A-state groups have performed significantly differentially from each other and the direction of performance confirms drive theory predictions. Level of anxiety activated in the experimental situation is a better predictor of performance. Trait-State Anxiety Theory assumes that an individual who perceives a particular situation as threatening responds to it with elevations of A-State. The intensity and duration of A-State reaction is determined by the amount of threat that the individual attributes to the situation. While measures of A-Trait provide useful information regarding the probability that high levels of A-state will be aroused, the impact of any given situation on a particular person can be best ascertained by taking actual measurements of A-State in that situation. No significant relationship has been found between A-Trait and performance of paired-associate task, whereas significant effects of A-State on performance have been observed.

Further, HI Ss perform better than LI Ss at all the stages of learning (Table 5-32) except in the last stages, where performance of both the groups become identical. It may be due
to the fact that in later stages incorrect responses are eliminated with practice. Further, in paired-associate learning the last stage comes round about 3rd trial after which performance of all the groups is parallel. Task proved relatively easy for most of the Ss.

According to extension of drive theory it is expected that early in learning HA would facilitate performance of HI Ss, while leading to performance decrement in Ss with LI Ss. In the present study the ANS arousal due to stress has been beyond the optimum effective level, so predictions of drive theory do not hold for the present findings. Like in Serial learning, in paired-associate too there has been significant increase in A-State scores from that of A-trait as a result of ego-stress. In high A-trait group (Table 4-2) mean number of anxiety scores 47.0, with SD of 5.9 for HI-HA group and 49.0 with SD 4.29 for LI-HA group. Whereas in high A-state the level of anxiety is much higher - in HI-HA group it is 60.0 with SD 3.9 and for LI-HA group it is 60.0 with SD 6.7 (Table 4-5). According to the norms (Spielberger, et al, 1969) level of anxiety is at 92 percentile. Evidently, such a high level of anxiety can not be expected to facilitate performance. Findings are consistent with Malmo's assumptions that performance varies as an inverted-U function of physiological activation (drive). Accordingly it is expected that low anxiety being moderate rather than low it would facilitate performance of LA Ss as compared to HA Ss at both the intelligence levels.

Anxiety, intelligence, and stages of learning (A x B x C) have interactive effects on performance on paired-associate
learning task. This interaction is interpreted and it shows that LA Ss perform significantly better than HA at both the levels of intelligence (HI and LI), over all the stages of learning (Table 5-33). Performance of LI-LA group is nearly comparable with HI-HA (Fig.7) group. These findings may be further comparable with paired-associate A-Trait findings of LI-C and HI-S groups (Fig-6). The two above mentioned figures (Fig-6 and 7) are just similar, indicating that stress effects are similar to A-state effects. Performance of HA groups has been consistently impaired at all the stages of learning and at both the levels of intelligence.

It has been the case in performance on serial learning that HA (A-state) had detrimental effects on performance of both the intelligence groups (Fig-4). In serial learning the detrimental effects continue until the last stage but in paired-associate learning performance in the later stages is not impaired. However, these detrimental effects may be attributed to arousal of anxiety beyond the optimum level. After a certain level of ANS arousal, rather than energizing the correct-responses anxiety starts interfering learning. Highly aroused anxiety interrupts the sequence of task completion and this interruption leads to detrimental effects, especially on the performance of HA Ss.

At LI level, LA Ss have performed better than HA Ss. HA Ss when indecisive prefer to take a chance than to come out with a wrong response. This defensive tendency in HA Ss does explain their inferiority to LA Ss even at LI. However, HI Ss gain confidence in the task sooner than their LI counterparts. Learning in the
former progresses faster than in the latter, as has been revealed by the present findings (Fig-7). Goulet and Mazzei (1969) found that tendency to withhold responses until confident in the correctness of the stimulus-response pairing was more apparent in LI Ss as compared to HI Ss especially at HA level. Another explanation that can be forwarded is that HA Ss tend to perceive situations that involve threats to self-esteem as more threatening than LA Ss, thus arousing higher levels of A-state. Therefore, high levels of A-state are experienced as detrimental to effective performance.

The present findings (both with serial learning and paired-associate learning) support Spielberger's contentions that it is meaningful to posit state and trait anxiety as separate and distinct anxiety constructs in research on anxiety and learning. Earlier studies that are consistent with Spielberger's contentions and also demonstrated the differential influence of stressful conditions on empirical measures of these two concepts are Johnson, 1966a; Johnson, 1968b; Johnson, 1968a; Johnson and Spielberger, 1968; Johnson, 1966b; O'Neil, 1969; O'Neil, Spielberger and Hansen, 1969; etc.

The findings in both the tasks, i.e., serial learning and paired-associate learning indicate that the variable of stress has to be taken into account, in order to arouse differential levels of drive in high and low A-trait Ss. The effects of different kinds of stress is a central feature in Spielberger's Trait-State Anxiety Theory (Spielberger, 1966; Spielberger, et al., 1971). Further it is very important to make proper measurements...
of anxiety aroused in a particular situation.

A-state provided results at a higher significance level (Table 5-29) than A-trait (Table 5-20). In A-trait analysis interaction between anxiety and intelligence has not been significant, because of identical performance of anxiety groups at both the intelligence levels. Both the analyses, with A-state and A-trait have not supported the predictions from the extension of drive theory to incorporate intelligence differences. Apparently, in A-trait anxiety has not been sufficient (or could not be related to performance because of gap in anxiety measurement and actual performance) and in A-state it exceeded the level of effective performance. Therefore, the results are better interpreted in terms of inverted-U hypothesis.

PHASE II
6-7 Effects of Intelligence and Anxiety (A-Trait) on Academic Achievement:

The relationship between anxiety and achievement has been suggested to be a complex one. To quote Warburton (1962), "The level of difficulty of the material and the stage of education reached may however be very important facts and the relationship may prove to be complex. Anxious person tends to be relatively more efficient at easy tasks and less efficient at difficult tasks, i.e., anxiety is a spur to success when a person tackles a task within his competence, but it becomes a handicap when serious difficulties arise." Besides, the degree of anxiety is important. According to the Yerkes-Dodson law (1908) there should be optimum drive level for any performance while intense anxiety
should have interfering effect, moderate or mild anxiety should have motivating effect on students.

The hypotheses for academic achievement have been based primarily on Spielberger's extension of drive theory to incorporate individual differences in intelligence. Accordingly it has been expected that HA would facilitate academic achievement of the Ss of higher intellectual ability (HI). Further HA Ss at lower range of ability (LI) would achieve less as compared to their LA counterparts. Evidence supporting the extension is scarce because of the traditional reluctance of experimental psychologists to come to grips with individual differences.

In the following pages, results pertaining to total achievement and achievement in different school courses are discussed separately as anxiety and intelligence are expected to effect differentially the achievement in different school courses.

6-7 A Effects of Intelligence and Anxiety (A-Trait) on Total (Aggregate) Achievement:

Interaction between anxiety and intelligence is found to be highly significant. Considerable support has been found for the hypothesis that HA would tend to facilitate the performance of HI Ss, while lowering that of the LI when compared with their LA counterparts. HA is found to be associated with greatest deficit for LI group (Table 5-35.b). As stated earlier, Spielberger's extension of drive theory takes into account the possibility that individual differences in intelligence and anxiety may have different effects on learning. It further states that these effects depend on the nature and difficulty of task.
For instance, a task of moderate difficulty may be expected to be relatively easy for HI Ss in whom fewer competing error tendencies are evoked and for whom strength of correct response tendencies is stronger. In contrast, such tasks may be quite difficult for LI Ss in whom numerous error tendencies are generated and the strength of correct response tendencies is weaker, especially at HA level. On such tasks HA should facilitate the performance of Ss with HI, while leading to decrements in Ss with LI.

As expected, intelligence has a very pronounced effect on aggregate achievement (Table 5-35.a). HI Ss, on the average, obtained more marks than LI Ss. It indicates that intelligence is a very crucial factor in achievement and that performance in academic achievement is significantly related to intelligence. Very clear difference in the performance of the two intelligence groups (HI and LI) may be partially attributed to the fact that sample in the present study consisted of wide range of Ss varying in intelligence level and selected Ss represented extremes of intelligence levels. However, highly significant main effect of intelligence (Table 5-31) supports the well-established positive relationship between intelligence and school achievement.

Effect of anxiety on aggregate achievement is not statistically significant. However, the trend in performance (Table 5-35.a) shows that LA Ss performed somewhat better than HA Ss. But there has been quite a number of correlational studies in which CMAS scores of children have been related to the measure of achievement. These studies report low negative but significant correlation between
anxiety scores and achievement measures (e.g., McCandless and Castaneda, 1956; Hafner and Kaplan, 1957; Cowan et al., 1965; Keller and Bowley; 1962; Phelps, 1968; Sinha, N.C.P., 1972). Same findings have been reported when other anxiety index such as TASC is used (e.g., Broen, 1959; Atkinson and Litwin, 1960; Sarason, 1963; Carrier and Jewell, 1966; Muroy, 1968; etc.). There are very few investigations studying the interaction of anxiety and intelligence.

It needs to be mentioned here that achievement in aggregate of school courses is an outcome of achievement in various school courses of simple as well as complex nature. Consequently, achievement in aggregate involves a multiplicity of skills and habits (Gaudry and Fitzgerald, 1971; Spielberger and Weitz, 1964). Some of the conditions that facilitate the achievement of HA students may have adverse effects upon the LA. So, the composite score might reflect the combined facilitative and debilitating effects of anxiety. It is quite likely that achievement, on the whole, is negatively influenced by anxiety, although not very significantly. Moreover, there are studies which have reported no relationship between anxiety and achievement measured on school sample (Wirt and Broen, 1967; Kitano, 1960; L'Abate, 1960; Chassell and Thomas, 1967).

Personality theorists have been concerned with considerable discrepancy between potential and performance and have held that personality attributes, especially anxiety, are significant factors in producing this discrepancy (e.g., Keller and Bowley, 1964). Experimental evidence has further shown that relationship
between anxiety scores and academic achievement, may be being obscured by an intelligence x anxiety interaction.

Effects of anxiety vary as a function of task difficulty and intelligence level of the S. School work seems to be too difficult for low aptitude students and relatively easy to high aptitude students. High aptitude students tend to obtain good grades, as compared to low aptitude students, irrespective of their anxiety level. It has been found in the present study that intelligence and anxiety have interactive effects on achievement in aggregate. Results support the hypothesis and are consistent with predictions based on Spielberger’s extension of drive theory. Denny (1966) using an ingenious concept formation task of moderate difficulty found the effects of anxiety and intelligence to be interactive. Katahn (1966) found a strikingly similar pattern of results.

The inverse relationship between anxiety and intelligence may be primarily due to the interfering influence of anxiety and further due to the inverse relationship between anxiety and intelligence test performance (Spielberger and Katzenmeyer, 1959; Broen, 1959; McCandless and Castaneda, 1956). To some extent, performance in academic situation is determined by individual’s knowledge of his own relative ability. There is a complex relationship between anxiety, ability and achievement (Feldhausen and Klausmeier, 1962; Frost, 1968; Spielberger, 1962). Spielberger (1962) found that low ability students earned poor grades in college irrespective of their anxiety (TIMA)-scores. For superior students, anxiety had facilitative effects.
Most learning which takes place outside the laboratory and which has any significance in human life is affected by a variety of factors other than anxiety. One of the most important of these—indeed, probably the most important—is general intelligence. In the achievement of general science, intelligence has proved to be highly significant (Table 5-36). As expected, HI Ss obtained significantly higher scores than LI Ss. Quite naturally no one can learn something which is beyond one's basic comprehension. Further, task complexity depends on the person's intelligence.

Unlike aggregate achievement, in general science anxiety produced significant (p .01) mean square. According to drive theory it is expected that high anxiety interferes in learning tasks in which incorrect response tendencies are dominating. There has been evidence that co-efficients of correlation involving the relation between anxiety and achievement in science are negative and significant (e.g., Keller and Bowley, 1964). These findings (Table 5-37, a) suggest that general anxiety interferes with science achievement and offer some additional support to the notion that anxiety interferes with cognitively demanding tasks. It has been determined by various researches that effects of anxiety vary with the nature and content of a particular course (e.g. Lynn, 1957; Cox, 1964; Zlotowicz, 1963; Kestenbaum and Wegner, 1970; Gaudry and Bradshaw, 1970; Gaudry and Fitzgerald, 1971; Merryman, 1974).
Interaction between intelligence and anxiety is significant beyond the .001 level (Table 5-36) for general science. The pattern of interaction indicates that (Table 5-37, b; fig-9) at both the levels of intelligence (HI and LI) LA Ss perform better than HA counterparts. HA has detrimental effect on achievement in general science. Magnitude of difference in performance of both the anxiety groups is more at LI level than at HI level. At LI level, besides limited capacity of the S, anxiety level plays a more significant role. Achievement comes so easily to the student of high intelligence that anxiety does not affect performance so significantly. However, if anxiety is found to have a disruptive effect even at HI level, this finding can be attributed to the nature of task. Very few investigations have been attempted to study the effects of general anxiety and intelligence on achievement in a general science course. As such, more research is needed in this area using a variety of samples.

6-7 C Effects of Intelligence and Anxiety (A-Trait) on Achievement in Mathematics:

In the achievement in mathematics, trend of results is consistent with that of general science. The main effect of intelligence, as expected, has been significant. But anxiety, averaged over intelligence, has not produced significant main effect. However, the trend of means indicates that LA Ss achieve somewhat higher scores on mathematics than HA Ss (Table 5-39.a).

There is significant interactive effect of intelligence and anxiety on achievement in mathematics. Interaction trends
are just the same (Table 5-39.b) as they are in the achievement of general science. At both the levels of intelligence HA has more debilitative effects and these debilitative effects are more pronounced at LI level. Anxiety effects seem to be more potential in case of Ss with limited ability, whereas at HI level anxiety can not affect performance and achievement comes to the S naturally, irrespective of drive level. Very few studies in this area have followed a factorial design to investigate this relationship. However, there are some correlational studies that reported negative correlation between anxiety and arithmetic (e.g., Lynn, 1957; Reese, 1961; Cox, 1964; Zlotowicz, 1963; Kestenbaum and Weener, 1970). Merryman (1974) reported that moderate and low anxiety Ss' performance is significantly better than HA on comprehension and vocabulary tasks.

It has already been stated that effects of trait anxiety, besides the intelligence level of the Ss, are also a function of the nature of the learning task. On courses involving numerical and comprehension abilities, such as mathematics and general science, anxiety tends to arouse many competing error tendencies which are stronger for LI Ss than for HI Ss. The skills involved in the achievement of mathematics and general science seem to be more or less, the same and high anxiety interfere in the mastering of these two courses. Results are consistent for both these courses and are in line with predictions of the extension of drive theory, for difficult tasks. Therefore, performance of HI-LA is better than HI-HA, likewise LI-LA is better than LI-HA (Fig-10). These findings are contrary to these achievement of all the three courses discussed so far. Gaudry and Fitzgerald (1971) reported significant
(beyond .05 level) interaction between intelligence and anxiety for achievement in mathematics, besides some other courses. Moreover the samples of this study comprised of high school girls who, in general, show less aptitude for subjects involving mechanical and arithmetic reasoning. Gaudry and Bradshaw (1970), using TASC scores, found that HA Ss performed worse than their LA counterparts on achievement in mathematics. Present results provide evidence that high anxiety impedes the acquisition of complex skills and cognitively demanding tasks.

6-7 D Effects of Intelligence and Anxiety (A-Trait) on the Achievement in English (Foreign Language):

So far learning of languages is concerned, and especially that of a foreign language, it is considered comparatively difficult because of some technicalities, such as learning of grammar, spirit of words and, above all, unfamiliarity with its vocabulary. Unlike the mathematics and general science courses, achievement in English does not involve numerical ability and urban girls are, by and large, good in learning tasks involving verbal ability.

As has been the case in all the courses, intelligence has pronounced effect on achievement in English also. HI Ss obtained significantly more marks than LI Ss. Anxiety as a main effect has not proved significant. Lynn (1957) and Cox (1964) reported TASC scores that reading scores were uncorrelated to A. Interaction between intelligence and anxiety is significant (Table 5-40) and the trend shows (Fig. 11) that at HI level HA facilitates achievement,
whereas it impairs achievement of LI Ss. These trends are consistent with the trends in aggregate achievement. Scarborough et al. (1961) investigated the relationship between anxiety and performance in language arts as compared with other academic achievement areas. They suggested that anxiety level makes a difference in children's reading and language achievement when intelligence is a factor. The obtained results support this contention. Anxiety, averaged over intelligence, has not produced any significant results, but when combined with intelligence it produces significant interaction. Results provide considerable support to the hypothesis that HA would tend to facilitate the performance of most able children, while lowering that of the LA counterparts. In contrast, HA would be detrimental for LI Ss as compared to LA counterparts. Similar findings have been reported by Gaudry and Fitzgerald (1971). Rustin (1966) reported findings consistent with the results obtained at LI level, i.e., a significant negative relation between anxiety and English. Intelligence was not considered.

6-7 E Effects of Intelligence and Anxiety (A-Trait) on Achievement in Mother-tongue (First Language):

Though the processes involved in the achievement of languages are, more or less, the same, yet acquisition of mother tongue is simpler than that of a foreign language. However, obtained results in the achievement of mother-tongue and foreign language (English) are comparable (Fig 11 and 12). In this analysis too anxiety, while averaged over intelligence, fails to
produce significant effects. Intelligence, as expected has significant effect on performance in the expected direction.

Interaction between intelligence and anxiety is significant and trends support the hypothesis and Spielberger's extension of drive theory to incorporate intelligence that HA facilitates learning of HI Ss and debilitates that of LI Ss. School courses, such as learning of mother-tongue, induce a very few error tendencies, thereby energizing correct responses in HA Ss earlier than in LA Ss. Furthermore, lack of achievement in such courses is not perceived as threatening because task-based stress is far less and not much value is attached to achievement in such course in academic/professional careers. However, findings are almost the same as were obtained when aggregate achievement and achievement in English language was considered.

6-7 F Effects of Intelligence and Anxiety (A-Trait) on the Achievement in Social-studies:

In general, a course in social studies is perceived as less threatening and less difficult, more meaningful and more interesting as it relates to the immediate physical and social environment of the student.

Obtained results for achievement in social-studies provide strong support to our hypothesis and are consistent with the results as cited earlier, with Aggregate, English and mother-tongue. To put it once more, intelligence is a significant factor in this analysis also. Anxiety, except in general science achievement, did not reach the significance
level in any other analysis, including social-studies.

However, interaction between intelligence and anxiety is significant. Trend in results (Fig-13) supports Gaudry and Fitzgerald (1971) findings for geography and history. Except in the achievement of general-science and mathematics, direction of interaction has been uniform for all the other courses. HA tend to facilitate performance of HI and impair the performance of LI Ss. Empirical evidence supporting extension of drive theory predictions has been provided by Denny (1966) and Katahn (1966) on laboratory learning. A consistent finding, in laboratory learning studies has been that HA has detrimental effects on performance especially at LI level, and the direction of effect is reversed at HI level. Denny's predictions on concept formation task have been so remarkably replicated on school achievement in this study. However, a good deal of replication of such studies is needed before reliable generalization could be made.

6-8a Over-view:

Anxiety as a main effect did not reach the level of significance except in case of general science. Anxiety scores are more or less unrelated to total academic achievement and various other courses. An important point to be noted here is that in the present study general anxiety (STAI-A-Trait) measure has been used. Studies with which results are compared, mostly made use of various specific anxiety measures, such as test anxiety etc. It has been, more or less, established that anxiety measures which are closely related, content-wise, to the situation in which performance has been evaluated, are better predictors of achievement than general
anxiety measures, (e.g., Broen, 1959; Davidson, 1959; Atkinson and Litwin, 1960; Sarason, 1963; Reubush, 1963; Carrier and Jewell, 1966; Muroy, 1968). However, there is some evidence in favour of general anxiety scales also as predictors of academic achievement (e.g., Cowen et al., 1965; Phelps, 1968; Keller and Rowley, 1962; Hafner and Kaplan, 1959; Mervyn, 1974; Bauermeister and Colon, 1974). Sarason (1963) concluded that anxiety-intelligence relationship is a function of anxiety scale employed. It would be more useful to use a test anxiety scale in further research in India.

Another crucial point in anxiety research is that of proximity between the administration of anxiety scale and the examination. In the present study anxiety scores were obtained almost a year before the annual examination was held on which the achievement scores have been based. This long gap might have obliterated the marked effects of anxiety. It is not essential that anxiety measured a long time back would reflect its effects as intensively as it would if measured in close proximity. It has been revealed by previously explained results of learning tasks, i.e., serial verbal learning and paired-associate learning, performance has been more significantly influenced by A-State scores as compared to A-Trait scores.

Effects of anxiety vary as a function of task difficulty. School work seem to be too difficult for low aptitude students and relatively easy for high aptitude students. Therefore, high aptitude students tend to obtain good grades, as compared to low-aptitude students, irrespective of their anxiety level. Further,
within various school courses nature and content of the course varies. A general finding has been that effects of anxiety are different for different school courses, depending upon the nature and content of a particular course. School courses demanding higher cognitive skills are liable to produce many dominating error tendencies in HA students even at HI level. It is clearly reflected by the present results that effects of anxiety are more marked for courses such as general-science and mathematics. There are certain temperamental differences between high and low anxious subjects. It is quite possible that some children do not learn to read because they are not anxious enough. Besides, there are some fundamental differences in the activities of boys and girls, especially HA female absorb more time in reading, in a bid to escape many active pursuits and confrontations in Indian settings. However, academic achievement is an extremely complex matter, involving various types of skills and abilities. It is more useful to analyze the results separately for each course.

Inverse relationship between anxiety and intelligence test performance has been reported (Spielberger and Katzenmeyer, 1959; Brown, 1959; McCandless and Castaneda, 1956; Rani and Thakur, 1970), which may be due to the interfering influence of anxiety. This has led some psychologists to suggest that the lower performance levels of HA Ss can be explained in terms of their lower intelligence. But this may not be conclusive and the interfering effects of HA may be pronounced only when evoked
by stressful situation. The most compelling evidence comes from research in nonstressful situation in which HA persons often do well and sometimes even better than LA persons of comparable ability. The present findings on laboratory learning tasks, under nonstress condition provide an evidence to the above statement.

Some studies have shown sex differences in academic achievement situation. Girls either experience more anxiety or give expression to it rather easily than boys. Several findings reveal that test anxiety is significantly higher in lower groups and in females (e.g. Fittkau and Langer, 1974; Beumeister and Colon, 1974, etc.). The present sample has been that of all girls in the adolescent age-group and probably they experience more anxiety. Further, there are some cultural differences too contributing to the effects of anxiety on achievement. The examination system in India is more anxiety inducing, as it is based on an essay type examination held only once a year. When STAI-A-State scores of American and Indian students were compared in EXAM and NORMAL conditions, Indian students reported a substantial increase in A-State scores from normal to exam situation. In general, Hindi students are examined less frequently than American students and it would appear that they perceive examination more stressful (Sharma, 1973; Spielberger and Shama, 1976).

Anxiety, on the whole, is influenced by age, quality of education, intelligence, and other psycho-social factors. It has been suggested by Levy (1969) that there are dangers in
assembling overall results concerning anxiety scales from different schools and different sexes.

If the findings of laboratory learning and academic achievement are compared, there are some similar findings as well different ones, which may be due to the nature of the two learning situations as well as the nature of tasks involved. Results obtained for academic achievement are, by and large, consistent with the hypothesis and Spielberger's extension of drive theory. Similarly findings of laboratory learning, under nonstress condition are consistent with the predictions. Findings under stress condition have not been in the expected direction.

There is a very important difference between the stress induced by artificial means in a laboratory and the natural occurring stress in an academic achievement situation. In laboratory stress is induced too abruptly, whereas examination stress accumulates gradually over some period of time with the approaching examination. This gradual increment in stress is also accompanied by necessary academic effort on the part of the individual. Therefore it may be that anxiety states aroused by the examination stress do not go beyond the optimum level of activation. The abruptly introduced stress tends to be more detrimental because the individual does not get enough time to think of the coping processes, and anxiety states for high anxious Ss exceed the optimal level of activation. In addition, stress in examination varies with the extent of involvement of an individual.
It is concluded that even IQ or intelligence alone has predictive efficiency. Combination of anxiety with intelligence does appreciably increase the accuracy of predicting its academic performance. The present findings confirm the earlier findings that general anxiety by itself has relatively little influence on scores on academic achievement.

The intelligence test used in the present study has been a group verbal test and the items are closely associated with the kind of learning in school. With the result that in achievement analyses, intelligence has always been a very significant factor. It would be worthwhile to replicate this study using a non-verbal intelligence test to measure intelligence and well-standardized objective type achievement tests for obtaining the indices of academic performance in different school courses.

6-8 b General Over-view:

While discussing the results, two major approaches to the study of anxiety performance interaction have been referred to in this research project. These were: (i) Yerkes-Dodson 'law' which conceives anxiety as generalized state of arousal or emotionality; (ii) The second major model has a Hullian basis which considers anxiety as a drive and postulate mechanisms of response competition to account for performance decrements.
The first approach leaves the reasons for performance decrements unspecified except that it postulates some type of interference from autonomic drive or from high arousal through the ascending reticular formation. According to Hamilton (1975, pp. 568), it may be assumed, though without much support from the existing literature, that the proponents of an inverted-U shaped relationship between performance and emotionality or arousal think of the mediating mechanisms in terms of signals from a highly active neurochemical system. These signals become intrusive and unavoidable noise in a central-processing and response integrating system, thus reducing its powers of freedom and its capacity to deal with external cues in a manner consistent with the stimulus and task requirements. Apart from a number of useful suggestions by Easterbrook (1959) and Wachtel (1967), however, the nature of the interference still remains to be elucidated.

On the other hand, the response competition theory has been refined by Broen and Storms (1961) by drawing attention to possible ceiling effects for dominant habits so that further increases in drive would strengthen only competing responses. Although this approach provided a first systematic attack on the nature of interference processes, its conception of an anxiety drive, rather than anxiety processes, shows it to be closely related to a Yerkes-Dodson position of a nonspecific emotionality or arousal concept.
Another imperfection in the drive analysis of anxiety is that no distinction has been made between competing responses that might be considered plausibly related to the task requirements, and the other type of competition arising from responses that are irrelevant to the performance of the task because they belong to different cognitive structures. Moreover, apart from the recent introduction of intelligence as a moderator variable by Spielberger in the drive/performance relationship and the distinction between state or situational anxiety and trait anxiety, no other individual differences appear to have been systematically investigated.

Some success has been achieved more recently with elaborations and specifications of the arousal concept of anxiety implied by drive theory. These reanalyses have started to emphasize cognitive components that distinguish between anxiety and other emotions such as anticipation and uncertainty (Lazarus and Averill, 1972); expectancy, incongruity, and response unavailability (Epstein, 1972); the presence of self-depreciation and rumination (Sarason, I.G., 1972), or of task-irrelevant self-instruction (Mandler, 1972) in the performance of test anxious subjects. Lazarus and Averill's and Epstein's concepts can be seen as instigators and representations of anxiety with specific implications for relatable behaviour. They do not define the concept, however, and do not appear to contribute to an understanding of deficits in cognitive power under conditions of anxiety except, again, in terms of arousal. Sarason and Mandler appear to come close to a new conceptualization of the role of anxiety in
performance decrements by considering it as interference from task-irrelevant information, as does Vine (1971) by pointing to the division between self-relevant and task-relevant variables in test anxious subjects. However, much remains to be learnt in this important area of psychological enquiry.