CHAPTER II

CONCEPTUAL FRAMEWORK

The objectives of the chapter are to: i) discuss Taylor-Spence Drive theory of anxiety and the predictions based on it; ii) highlight the main features of Spielberger's extension of Drive theory to incorporate individual differences in intelligence, and predictions based on it; iii) enumerate the main features, assumptions and predictions of Spielberger's Trait-State Anxiety theory; iv) provide evidence regarding the validity of trait and state anxiety distinction; v) present a brief review of the self-report measures of anxiety; and vi) to discuss the essentials of the concept of stress and the various types of stressors utilized in laboratory settings.

2-1 CONCEPT OF ANXIETY

A systematic study of anxiety started with Freud's conceptualisation of it as a signal of danger and later as constituting three main attributes: a specific unpleasurable quality, efferent or discharge phenomenon, and perception of these. Anxiety remained a psychoanalytic concept for a long time. Freud stressed the signalling properties of anxiety and earlier Pavlov also considered apprehension of danger as an important characteristic of anxiety (cf. Spielberger, 1972). Later, neo-Freudians, Horney, Goldstein, May, Rogers, Sullivan,
Fromm-Reichman, and Basowitz, Persky, Korchin and Grinker, presented views, more or less, consistent with Freud's formulation of anxiety as an emotional state, and as a reaction to environmental conditions perceived by the child as threatening to his development and integrity. Anxiety has been distinguishable from other emotions by its unique combination of phenomenological and physiological components. Following Freud, Neo-Freudians emphasised the apprehensive or signalling properties of anxiety and contended that its origin lies deep rooted, i.e., related to earliest unpleasant experiences of childhood, is internally derived, provoked by threat to the integrity of an individual, is accompanied by feelings of fear of isolation, insecurity, helplessness, and perception of the outside world as hostile. A theory based on psycho-analytic approach, enunciated by Sarason and colleagues, advanced the view that anxiety is largely determined by the nature of a situation and interacts with personal characteristics of the individual (Sarason, 1972a).

2-1.1 Anxiety as an Emotionally-based Drive

Drive theory (Taylor, 1953, 1956; Spence, 1956) proceeds from Hull's (1943) assumption that strength of a given response (R) is a function of level of excitatory potential (E), determined by all habits (H) present, and activated in a given situation which combine multiplicatively with the total effective drive (D) state, \( R = f(E) = f(DxH) \).
It is envisaged as a generalised energiser of behaviour that combines indiscriminately with all habits present. Total effective drive, in the Hullian system, is determined by the summation of all extent need states, primary and secondary, irrespective of their source and their relevancy to the type of reinforcement employed. In more than the past three decades much research on anxiety in India has been stimulated by the Drive theory (see Sharma, 1978). Drive theory has two assumptions: i) noxious or aversive stimuli arouse a hypothetical response, 're'; and ii) drive level is a function of the strength of 're'.

The Manifest Anxiety Scale (MAS) was developed by Taylor (1953) to measure the emotional responsiveness. This indicates the level of drive 'D'. Anxiety has evidently been used in the sense of a constant characteristic or trait of the individual scores on the MAS which reflect differences in a chronic emotional state and also different potentialities for anxiety arousal. High anxiety (HA) subjects are apt to react more emotionally and adapt less readily to novel and threatening situations. Whether level of anxiety is chronic or is a function of the strength of a particular stressful stimuli remains a tentative question (Spence & Spence, 1966).

2-1.2 Predictions of Drive Theory

Since response strength is determined, in part,
by 'E', the implication of varying drive level in any situation in which a single habit tendency is evoked is clear: The higher the drive, the greater the value of 'E' and hence of the response strength. Thus, in simple non-competitio nal experimental arrangements involving only a single habit tendency, the performance level of high 'D' groups should be greater than that for low 'D' groups. Spence's theory is straightforward when applied to learning situations in which only one response is possible and occurs invariably, as is the case with conditioning, when there is no choice of responses. In such a situation high anxiety should facilitate learning. It has been hypothesised by the proponents of this theory that instances in which the initial habit strength of the correct response is stronger than the strength of competing responses, performance would be positively related to drive level. If the correct response is weaker than the competing response tendencies, higher drive would lead to poorer performance.

Spence's theory holds that anxiety will energise or strengthen each habit in a hierarchy in proportion to the initial strength of the habit. So in a situation of complex learning with many incorrect competing response tendencies, the effect of anxiety as an energiser is to increase the habit strength of incorrect tendencies to the disadvantage of the lone correct response. Learning, thus, proceeds very slowly. With practice, sooner or later,
correct response starts taking place more frequently, so the position for the correct response tendency improves. Hence, the effect of drive at this stage increases the habit strength of correct response more and more. Eventually a point is reached at which high drive starts facilitating learning (Spence & Spence, 1966).

2-1.3 Spielberger's Extension of Drive Theory

In all the experiments concerning the effect of anxiety on learning, task difficulty itself is an important variable which should be manipulated. Task difficulty, in turn, is a function of subject's intelligence. Spielberger (1966, 1975) suggested that the inconsistent findings in studies dealing with anxiety-learning relationship may result from the failure to evaluate the effects of individual differences, in intelligence. In his extension of Spence-Taylor Drive theory, Spielberger (1966, 1972) hypothesised that the relative strength of the correct and competing response tendencies elicited in a learning task, are a function of the intellectual level of the subject. The primary hypothesis from which this extension proceeds is that the difficulty level of the learning task will depend upon the intelligence level of the subject. For example, in 'simple learning tasks,' few error tendencies are evoked. High anxiety (HA) would, therefore, is expected to facilitate the performance of all subjects irrespective of their intellectual ability.
A task of 'moderate difficulty' may evoke relatively few error tendencies in high IQ subjects, but the same task may generate numerous competing error tendencies in low IQ subjects. On such a task high anxiety (drive) would be expected to facilitate the performance of high IQ subjects and impair the performance of low IQ subjects relative to their low anxiety counterparts (Denny, 1966; Katahn, 1966; Gaudry & Spielberger, 1971; and Ravinder, 1977).

For 'difficult tasks', it would be predicted that the performance of low anxious subjects would initially be superior to that of high anxious subjects of comparable ability. As the task becomes easier with repeated practice, performance should come to resemble that on the early trials of task of intermediate or moderate difficulty, high anxiety, eventually, facilitating the performance of high IQ subjects (Denny, 1966; Gaudry & Spielberger, 1970; Skaalvik, 1977; and Bermuder, 1978). These predictions are based on the assumption that high drive activates correct response tendencies for the high IQ subjects than for the low IQ subjects. Consequently, in investigations of the effects of anxiety (drive) on the learning process, the influence of individual differences in intellectual ability should be evaluated at different stages of learning. In all types of learning, the effects of anxiety may vary with the type and level of difficulty
of the learning material used and the ability level of the subject.

2-2 TRAIT-STATE ANXIETY THEORY

In the framework of Spence-Taylor's emotionally based Drive theory, Spielberger (1966, 1971, 1972, 1975) have proposed a theoretical statement of the relationship between two different, yet related aspects of anxiety: A-Trait (trait anxiety) and A-State (state anxiety).

Spielberger (1972) asserted much of ambiguity and semantic confusion associated with the concept of anxiety resulted from more or less indiscriminate use of this term to refer to two related, yet logically very different concepts. Distinction between A-Trait and A-State has clarified semantic confusion considerably and has helped to procure anxiety a conceptual status as a scientific construct. It is implied in the Trait-State Anxiety theory that the research on anxiety and performance must specify the conditions under which anxiety states are aroused. This theory takes into account the various kinds of stress. The intensity of the anxiety reactions is assumed to be proportional to the magnitude of external danger: The stronger the perceived threat, the more intense is the resulting reaction.

Initially influenced by (Cattell & Scheier's 1961; and Cattell, 1966) factor analytical approach to
personality and their studies of mood states, Spielberger, (1966, 1971, 1972a, 1972b, 1975) maintained that an adequate theory of anxiety must distinguish between anxiety as a transitory state (A-State) and as a relatively stable personality trait (A-Trait). Another major task for Trait-State Anxiety theory has been to identify the characteristics of stressful situations that evoke differential levels of A-State in persons who differ in A-Trait. A comprehensive theory of anxiety must differentiate between the situations that evoke anxiety reactions, the properties of anxiety states, the complex psychological processes that mediate between stressful stimuli and emotional responses, and the nature of anxiety as a personality trait.

2-2.1 Anxiety as a Trait

In general, personality traits have been described as relatively enduring individual differences among people in specifiable tendencies to perceive the world in a certain way and in dispositions to react or behave in a specified manner with predictable regularity. Personality traits reflect individual differences in the frequency and intensity with which certain emotional states have been manifested and in the probability of occurrence of such states in future. Frequency and intensity of an emotional state depend upon the strength of personality traits (see Spielberger, 1966, 1972, 1975).
Specifically, anxiety as a personality trait (A-Trait) has been defined in terms of relatively stable individual differences in anxiety proneness, i.e., to perceive a variety of situations as threatening and to respond to these situations with differential elevations in state anxiety (Spielberger, 1966, 1972, 1975). A-Trait may also be regarded as reflecting individual differences in the frequency and the intensity with which A-States have been manifested in the past, and the probability that such states will be experienced in the future. Persons who are high in A-Trait tend to perceive a large number of situations as dangerous or threatening than persons who are low in A-Trait, and respond to threatening situations with A-State elevations of greater intensity.

While there is a wide agreement that it is necessary to differentiate between state anxiety and trait anxiety (Spielberger, 1972a), Backer (1982) points out that a conceptual distinction between state anxiety and trait anxiety will be of advantage in the domain of test anxiety (a situation specific trait anxiety) as well. The widely known instruments measuring general or test anxiety only aim at its trait aspects. Backer (1982) also observed that test anxiety can be conceptualised as a state, as a trait and as a process.

2-2.2 Anxiety as a State

Personality states may be regarded as temporal cross-sections in the life of a person, a personality
state exists at a given moment in time, and at a particular level of intensity. Personality states are necessarily transitory in nature and can be evoked only by a suitable stimulus in a particular situation. They are as enduring as the evoking conditions. Quality and intensity are the unique and distinctive features of personality state. State anxiety (A-State) has been conceptualised by Spielberger (1966, 1972, 1975) as a transitory emotional state or condition of human organism that varies in intensity and fluctuates over time. This condition is characterised by subjective, consciously perceived feelings of tension and apprehension, and activation of the autonomic nervous system (ANS). The level of A-State should be high in circumstances that are perceived by an individual to be threatening, irrespective of the subjective danger, A-State intensity should be relatively low in non-stressful situations, or in circumstances in which an existing danger is not perceived as threatening.

2-2.3 Anxiety as Process

The term anxiety is also used to refer to a complex psychological process (Spielberger, 1972b). In essence, the concept of anxiety as a process implies a theory of anxiety that includes stress, threat, and state anxiety as fundamental constructs or variables. Thus, anxiety-as-process refers to a sequence of cognitive, affective, psychological and behavioural events. This
process may be initiated by a stressful external stimulus that is perceived or interpreted as dangerous or threatening, or by a thought or idea that forecasts threat or that causes the individual to recall an earlier danger situation. 'Cognitive appraisals' of danger are immediately followed by A-State reactions, or by an increment in the level of A-State intensity. It should be noted that while an anxiety state lies at the base of the anxiety process, this process also involves stress, threat, physiological changes, and behavioural reactions. The concept of anxiety-as-process implies the following temporally-ordered sequence of events:

\[ \text{External danger} \rightarrow \text{Perception of danger} \rightarrow \text{Emotional reactions} \]  
\[ \text{(Stress)} \rightarrow \text{(Threat)} \rightarrow \text{(State anxiety)} \]

Since elevations in state anxiety are experienced as unpleasant or painful, an individual will engage in cognitive and behavioural operations or responses that serve to reduce or minimise this discomfort. The individual may first reappraise the stressful circumstances that initiated the anxiety process, and this reappraisal may help him to identify appropriate coping mechanisms for alleviating the stress, or it may lead to avoidance behaviours that permit him to escape from the anxiety arousing circumstances. If he is unable to cope with or avoid the stress, he may engage in intrapsychic manoeuvres (psychological defenses) that serve to reduce the level of
A-State intensity through repression, denial, projection, or other mechanisms that distort his perception of the stimuli that initiated the anxiety process. Thus, an anxiety state may give rise to the following sequence of reactions:

A-State $\rightarrow$ Cognitive $\rightarrow$ Coping, Avoidance Behaviours or Psychological Defenses

The concept of anxiety-as-process is reflected in the traditional distinction between fear and anxiety. 'Fear' generally denotes an emotional reaction to the anticipation of injury or harm from some real, objective danger in the external environment. Another defining characteristic is that fear reaction is proportional to the magnitude of the danger that evokes it. In contrast, 'anxiety' is traditionally regarded as an 'objective' emotional reaction because either the stimulus conditions that evoke it are unknown or the intensity of the emotional reaction is disproportionately greater than the magnitude of the objective danger. Thus, the traditional distinction between fear and anxiety is based on the assumption that similar emotional reactions result from the operation of different mediating processes.

An adequate theory of anxiety must also distinguish between the concept of 'stress' and 'threat'. While these terms are often used interchangeably by those who
research anxiety phenomenon, in Trait-State Anxiety theory, however, they denote different aspects of a sequence of events that culminates in the arousal of an anxiety state (Spielberger, 1971, 1976). 'Stress' refers to variations in environmental conditions or circumstances that are characterised by some degree of objective danger. 'Threat' refers to the subjective appraisal or interpretation of a particular situation as ominous, frightening or dangerous. The term state anxiety (A-State) refers to the complex emotional reaction that is evoked in an individual who interprets a stressful situation as personally threatening to him.

According to this usage by Spielberger (1971, 1976), 'stress' refers to the objective stimulus properties of a situation, whereas 'threat' refers to an individual's idiosyncratic perception of a situation as physically or psychologically dangerous or frightening for him. It is conceivable that objectively stressful situations will not be interpreted by some individuals as threatening because they do not appraise these situations as dangerous. Conversely, situations that most people regard as benign may be perceived as highly threatening by people for whom they have special traumatic significance.

2-3 ASSUMPTIONS OF TRAIT-STATE ANXIETY THEORY

Trait-State Anxiety theory (Spielberger, 1966, 1972, 1975) provides a conceptual frame of reference for
classifying the major variables that should be considered in anxiety research and suggests possible inter-relationships among these variables. The theory is especially concerned with clarifying the properties of A-State and A-Trait as psychological constructs, and with specifying the characteristics of stressful stimulus conditions which evoke differential levels of A-State in persons who differ in A-Trait. The theory also recognises the centrality of cognitive appraisal in the evocation of an anxiety state, and the importance of cognitive and motoric processes (defense mechanisms) that serve to eliminate or reduce anxiety states.

A schematic diagram of Trait-State Anxiety theory is presented in Figure 2.1 which provides a cross-sectional analysis of anxiety phenomenon. The theory assumes that the arousal of anxiety states involves a process or sequence of temporally ordered events initiated by either external or internal stimuli that are perceived to be dangerous or threatening by an individual. As previously noted, situations or circumstances in which personal adequacy is evaluated are likely to be perceived as more threatening by high A-Trait individuals than by persons who are low in A-Trait. It should be noted, however, that the appraisal of a particular stimulus or situation as threatening is also influenced by a person's aptitude, abilities, and past experience, as well as by his level of A-Trait and the objective danger that is inherent in the situation.
FIG. 21 SCHEMATIC DIAGRAM OF TRAIT-STATE ANXIETY THEORY (SPIELBERGER, 1966)

INTERNAL STIMULI
THOUGHTS, FEELINGS, BIOLOGICAL NEEDS

EXTERNAL STIMULI
(STRESSORS)

COGNITIVE APPRAISAL

A-TRAIT
INDIVIDUAL DIFFERENCES IN ANXIETY PRONENESS

SUBJECTIVE FEELINGS OF APPREHENSION, ANNOYING EXPECTATION
A-STATE
ACTIVATION (AROUSAL) OF THE AUTONOMIC NERVOUS SYSTEM

DEFENSE MECHANISM
ADJUSTIVE PROCESSES FOR AVOIDING OR REDUCING A-STATES

BEHAVIOR

SENSORY AND COGNITIVE FEEDBACK

HIGHLY OVER-LEARNED RESPONSES TO THREATENING STIMULI

RESPONSE TO STIMULI APPRAISED AS NONTHREATENING

ALTERATION OF COGNITIVE APPRAISAL BY DEFENSE MECHANISMS
Once a stimulus situation is appraised as threatening it is assumed that: i) an A-State reaction will be evoked; and ii) the intensity of this reaction will be proportional to the amount of threat the situation poses for the individual. It is further assumed that the duration of the A-State reaction will depend upon the persistence of the evoking stimuli and the individual's previous experience in dealing with similar circumstances. Stressful situations that are encountered frequently may lead an individual to develop effective coping responses that quickly alleviate or minimise the danger and thereby immediately reduce level of A-State intensity. A person may also respond to threatening situations with defensive processes that serve to reduce the intensity of A-State reactions. High level of A-State intensity are experienced as unpleasant and may serve to initiate cognitive or motoric processes that have effectively reduced A-State in the past.

It was also noted previously that the two important classes of stressor situations can be identified that appear to have different implications for the evocation of A-State in persons who differ in A-Trait: i) individuals with high A-Trait appear to interpret circumstances in which their personal adequacy is evaluated as more threatening than do low A-Trait individuals; and ii) situations that are characterised by physical danger
are not interpreted as differentially threatening by high and low A-Trait subjects. Accordingly, differential elevations in A-State would be expected for persons who differ in A-Trait under circumstances characterised by some threat to self-esteem, but not in situations that involve physical danger unless personal adequacy is also threatened.

On the basis of this discussion, the main assumptions of Trait-State Anxiety theory have been summarised by Spielberger (1966, 1972, 1975), as under:

1) In all situations that are appraised by an individual as threatening, an A-State reaction will be evoked. Through sensory and cognitive feedback mechanisms, high levels of A-State will be experienced as unpleasant.

2) The intensity of an A-State reaction will be proportional to the amount of threat that the situation poses for the individual.

3) The duration of an A-State reaction will depend upon the persistence of the individual's interpretation of the situation as threatening.

4) High A-Trait individuals will perceive situations or circumstances that involve failure or threats to self-esteem as more threatening than will persons who are low in A-Trait.
v) Elevations in A-State have 'drive' properties that may be expressed directly in behaviour or that may serve to initiate psychological defenses that have been effective in reducing A-State in the past.

vi) Stressful situations that are encountered frequently may cause an individual to develop specific coping responses or psychological defense mechanisms which reduce A-State by minimising the threat.

2-4 VALIDITY OF TRAIT-STATE DISTINCTION

The basic inter-relationships among the factors of trait anxiety, state anxiety, environmental stressors and performance are also shown in Figure 2.2.

![Diagram](image)

FIG.2.2 THE BASIC, TRAIT-STATE CONCEPTUALIZATION (HOCKEY, 1983, p. 274)

The major assumption is that transient states of anxiety are interactively determined by the individual's susceptibility to anxiety (trait anxiety) and by degree of stress inherent in the situation. State anxiety affects information processing and behaviour more directly
than trait anxiety, since the influence of trait anxiety is mediated by state anxiety (Hockey, 1983).

The Trait-State approach makes various prediction which have been investigated experimentally, since state anxiety is allegedly affected by the degree of environmental stress, whereas trait anxiety is not. It follows that trait anxiety should be more stable or consistent than state anxiety across situations varying in stressfulness. This prediction has been confirmed a number of times (Allen, 1970; Marluza & Kallstrom, 1974) with trait and state anxiety usually being measured by the various versions of the STAI. In India, Sharma (1976) studied changes in state and trait anxiety as a function of an approaching final examination for a sample of 68 graduates. These students were administered the Hindi STAI A-State scale developed by Spielberger, Sharma and Singh (1973) on four occasions: 125, 65, 25 and 5 days before final examinations of the Panjab University. As the final examination approached, mean A-State scores consistently increased, with the greatest increase occurring between the third and fourth administration of the scale. In contrast, the A-Trait scores for these students were relatively stable for the same time periods. These findings provide evidence of the construct validity of the Hindi A-State scale as well as validate Trait-State distinction.
Another prediction is that there should be relatively small differences in state anxiety between groups high and low in trait anxiety under non-stressful conditions, but that there should be much larger differences under stressful conditions (Spielberger, 1972). A significant interaction between trait anxiety and degree of situational stress has been found a number of times supporting the above contention (see Shedletsky & Endler, 1974). Endler and Okada (1974) have indicated that in order for the anxiety trait X stressful situation interaction to be effective in inducing changes in A-State arousal, the components or dimensions of A-Trait must be congruent with the stressful situation. It is, however, clear in some studies the predicted interactions have mainly been obtained when stress involves threat to self-esteem (e.g., threat of failure), and not when stress involves physical danger (e.g., threat to electric shock).

Endler, Magnusson, Ekehammar and Okada (1976) have shown that A-Trait and A-State are highly correlated under non-stressful conditions. This finding raises some doubts about Spielberger (1972) justification to treat A-Trait and A-State as two distinct concepts. Moreover, Endler and Shedletsky (1973) found that both threat of failure (ego-threat) and threat of shock (physical-threat) evoked A-State arousal, but changes in A-State were unrelated to level of A-Trait under ego-threat situations.
In the physical-threat situation, changes in A-State were related to A-Trait level in that high A-Trait subjects showed greater A-State arousal than did low A-Trait subjects. Thus, these findings did not support the predictions of Trait-State Anxiety theory. This may be due to the differences in measures of anxiety, i.e., S-R Inventory of Anxiousness. It is also possible that there was an ego-threat component in the Endler and Shedletsky's (1973) physical-threat condition, and/or their ego-threatening condition may not have been sufficiently intense to produce differential A-State arousal for high and low A-Trait subjects. It seems most likely, however, that the discrepancy was due to the fact that Hodges (1968), Spielberger et al. (1970), and Rappaport and Katkin (1972) assessed A-Trait via the Taylor MAS and the STAI, which are unidimensional. Ekehammar and Magnusson (1973), Endler and Shedletsky (1973), Endler (1975a), Endler and Okada (1975) have reported evidence for the multidimensional nature of A-Trait for college students. It is contended by these researchers that both the STAI and MAS measure primarily ego-threat or interpersonal trait anxiety and that ego-threatening situations interact with interpersonal A-Trait (STAI or MAS) to elicit differential A-State changes for high and low interpersonal A-Trait subject, and that when a physical danger threat situation interacts with the interpersonal A-Trait (MAS or STAI) no differential changes in A-State
occur. The S-R-Inventory of Anxiousness, which is multidimensional, enables one to obtain measures of A-Trait associated with interpersonal (ego-threat), physical danger, and ambiguous (both ego-threat and physical danger) situations.

The factor structure of the STAI has also been investigated by Vagg, Spielberger and O'Hearn (1980) to determining whether the STAI state anxiety and trait anxiety scales are multidimensional. The two-factor and four-factor solutions were found to be equally good in terms of simple structure. The two-factor solution gave clearly defined state and trait anxiety factors, thus, provided strong support for the meaningfulness of the Trait-State distinction in the measurement of anxiety. The four-factor solution indicated that the STAI state anxiety and trait anxiety scales were both comprised of two main components which are defined by anxiety-present and anxiety-absent items. These factors have been found to be congruent with similar factors identified by Barker, Barker and Wadsworth (1977), Gaudry and Poole (1975), Gaudry, Vagg and Spielberger (1975), Kendell et al. (1976), Spielberger, Vagg, Barker, Donham and Westberry (1980). However, Endler and Magnusson (1974), Endler et al. (1976) and Loo (1979) also factored the state anxiety and trait anxiety items separately. The results of these three studies did not directly contribute to clarify the
findings of distinctive state and trait anxiety factor in the STAI. But most of the Western studies support the Trait-State distinction. However, no such attempt has been made in India so far.

In sum, the Trait-State approach to anxiety is a valuable one; in particular, there is a clear evidence that experienced or state anxiety is frequently determined conjointly by environmental stress and trait anxiety (Hockey, 1983, p.276).

2-5 MEASUREMENT OF ANXIETY

The Taylor (1953) Manifest Anxiety Scale (MAS) and the Mandler-Sarason (Mandler & Sarason, 1952) Test Anxiety Questionnaire (TAQ) were among the first of psychometric instruments developed to assess individual differences in anxiety in adults. Other instruments designed to assess anxiety in adults have been constructed by Cattell and Scheier (1963), Endler, Hunt and Rosenstein (1962), Spielberger et al. (1970) and Zuckerman (1960). A number of self-report scales have been developed for measuring general and test anxiety in children (Castaneda, McCandless & Palermo, 1956; Sarason, Davidson, Lighthall, Waite & Ruebush, 1960; Spielberger 1973). Test Anxiety Scale (Sarason, 1972a,1978) and Test Anxiety Inventory (Spielberger, Gonzaler, Taylor, Algaze & Anton, 1978) measure test anxiety as a situation-
specific personality trait. Some of these test anxiety measures have also been standardised in India. Nijhawan (1972) has developed the Hindi and Punjabi versions of Sarason's Test Anxiety Scale for Children (TASC). The Hindi version of Test Anxiety Inventory (TAI) has been developed by Sharma, Sud and Spielberger (1983). The Hindi TAI provides separate scores on worry (W) and emotionality (E) components of test anxiety and its factor structure has been established by Jutshi (1983).

General (Trait) anxiety scales developed in India include Sinha Anxiety Scale (Sinha, D., 1962, 1965) and its shorter version (Khan & Hassan, 1981); Taylor Manifest Anxiety Scale (Singh & Thakur, 1968); Cattell and Scheier's IPAT Anxiety Scale (Hundal & Kaur, 1974); Comprehensive Test of Anxiety (Sinha, A.K.P. & Sinha, L.N.K., 1969; Krishna, 1970); Hindi version of State-Trait Anxiety Inventory (Spielberger, Sharma & Singh, 1973; Spielberger & Sharma, 1976). Recently, Tripathi and Rastogi (1978) have developed an anxiety scale in which items for state-trait anxiety and also items for free-floating anxiety have been included. All but one of the above scales are primarily measures of trait anxiety. Kaliappan, Rajalakshmi and Menon (1982) concluded that the TAMS is a confounded measure of trait and state anxiety. Sharma and Dang (1977) have shown that although A-Trait scale of Hindi STAI is primarily a dispositional measure of individual differences in responding to
situations involving threat to self-esteem, unlike the findings on the Western groups, this scale is related to individual differences in responding to physical danger as well. Since state anxiety is a psychological concept, both the phenomenological and the physiological components of A-State should be measured. Various measures of autonomic nervous system activity that have been employed to assess the physiological aspects of transitory states have been reviewed by Levitt (1967), McReynolds (1968), Lader and Marks (1971). Zuckerman's Affect Adjective Check List (AAACL) and the A-State scale of the STAI are currently the most widely used self-report instruments for assessing the phenomenological component of A-State.

As indicated earlier, most of the scales developed to assess anxiety appear to measure trait anxiety, i.e., individual differences in anxiety proneness. In current research the Taylor MAS, the IPAT Anxiety Scale, and the A-Trait scale of the State-Trait Anxiety Inventory (STAI) are used most often for the assessment of trait anxiety. These three scales are highly correlated with one another and appear to measure anxiety proneness in social evaluative situations (Spielberger et al., 1970).

The STAI has been developed to provide relatively brief, homogenous self-report measures of both state (A-State) and trait (A-Trait) anxiety (Spielberger,
The item selection and validation procedures that were employed in the construction of the STAI are described in detail by Spielberger et al. (1970). Both A-State and A-Trait scales of the STAI consist of 20 items. Each A-Trait item has been determined to be impervious to situational stress and relatively stable over time. In constructing the STAI A-State scale, the essential qualities that are measured include tension, apprehension, and nervousness as these feelings or states varied along a continuum of increasing levels of intensity. Low scores reflect states of calmness and serenity, intermediate scores are designed to indicate moderate levels of tension and apprehensiveness, and high scores correspond with intense states of fright and apprehension, approaching panic.

Over the last decade, the STAI has been used more often in research than any other anxiety measure (Buros, 1978). Since 1980, an average of more than 225 published studies per year included the STAI as a measure of anxiety. The STAI is widely used in cross-cultural research and has been translated or adapted in 32 languages or dialects, namely, Arabic, Cambodian, Chinese, Dutch, Finnish, French, German, Greek, Hebrew, Hindi, Hungarian, Italian, Japanese, Kiswahili, Korean, Laolian, Luganda, Malaya, Norwegian, Polish, Portuguese, Romanian, Russian, Serbo-Croatian, Sinhola, Slovak, Spanish, Swedish, Tagalog, Turkish, Vietnamese and Zulu (Spielberger, 1984). There is now also available a revised STAI (Form-Y),
published by Spielberger (1983), In this, thirty per cent of the original items have been replaced, and it is claimed that the psychometric properties of both state anxiety and trait anxiety scales in Form-Y are superior to the earlier version. The correlation between the two forms have been observed uniformly high ranging from 0.96 to 0.98 (Spielberger, 1983). Detailed information about the reliability, validity and psychometric properties of STAI (Form-X), the STAI (Form-Y), are reported in the respective Manuals for these scales (Spielberger et al., 1970; Spielberger, 1983). These sufficiently well-standardised versions of the STAI permit a great deal of genuine cross-cultural research on the self-reporting anxiety. 

Not a single study has been published upto 1979 in India in which psychological, psycho-physiological and biochemical measures of anxiety were either employed simultaneously or intercorrelated. It is necessary to measure several aspects of anxiety together to study the intercorrelations among them. In a series of well-designed studies, P.K. Chattopadhyay and colleagues at the University of Calcutta, have simultaneously considered psychological (self-report measures of state and trait anxiety), physiological (skin resistance, blood pressure), neuro-endocrinological (plasma cortisol & prolactin) mechanisms (Chattopadhyay, Biswas, Chattoraj & Basu, 1979; Chatterjee, Chattopadhyay, Roy, Biswas, Bhattacharyya, &
Basu, 1980; Chattopadhyay & Das, 1982; Chattopadhyay, Dasgupta & Ghosh, 1982a, 1982b; Chattopadhyay, Dasgupta & Laha, 1982; Das & Chattopadhyay, 1982; Mukerjee, Chattopadhyay, Pal & Ghosh, 1982; Upadhyay, 1978; Chattopadhyay & Biswas, 1983; Vats, 1983). Besides other findings, all these studies point out to the following:

i) While the physiological, psychological measures are sensitive in detecting the level of anxiety in normals and patients, there are positive but non-significant relationships among self-report and physiological measures of anxiety in normal, anxiety and schizophrenic groups. Thus, general anxiety scales and autonomic responses appear to be independent or these measures are not equally sensitive in detecting level of anxiety in an individual.

ii) Positive relation between plasma cortisol and anxiety is found only when the latter is measured objectively.

iii) Of the various measures of anxiety, biochemical measures appear to be most sensitive index of anxiety for the high anxious groups, but psycho-physiological measures are most sensitive for the low anxious group.

On the basis of all these studies, it can be concluded that there is a difference in various parameters in their reactivity in expressing extent of anxiety that
prevails in an individual, be he a patient or a normal. The prime question is to what extent a particular experimental situation would be expected to facilitate consistency between self-report and the autonomic measures. In fact, all these studies show that various psychological, psycho-physiological and endo-crinological measures indicate a pattern of multiple responses and there is a response specificity in expression of anxiety/arousal in normals, and patients with psychiatric complaints. The limitations of the applicability of subjective measures on to pathological population have also been emphasised (Dasgupta, Chattopadhyay & Ghosh, 1983).

2-6 CONCEPT OF STRESS

The study of man's reactions to conditions of intense psychological stress has been a major concern of psychological investigations for a long time. The concept of 'stress' is one of the significant and integrative concepts ever developed in the social and biochemical sciences, its potential as a prime intellectual tool for not only understanding but also explaining individual and collective human behaviour and disorders has not yet been fully realised. What has hampered the adequate use of the concept of stress is the fact that different investigations have employed somewhat different references or meanings for the term 'stress' and thus, have employed
different explicit or implicit models; many of these have ignored important variables as well (see Burchfield, 1979). Definition of 'stress' have focused upon stimulus as an external negative force impinging on an individual response - as an individual's emotional and/or physiological response to external or internal environmental events; or interactional elements as a person - environment problem resulting from perceptions and appraisals of one's internal and/or external environments (Cox, 1978; French, Rodgers & Cobb, 1974; Caplan, Tripathi & Naicu, 1985; Asthana, 1985). The later view of 'stress' is dependent upon the work done by Lazarus, Averill and Opton (1970).

A seminal influence on the whole field of stress research has been the work of eminent Canadian scientist Selye (1950, 1974, 1976) who defined 'stress' as the 'non-specific response of the body to any demand'. Approaching 'stress' from a physiological point of view, Selye and his colleagues have conducted extensive investigations over the past 40 years on the widespread non-specific bodily changes that occur as reactions to stressful situations. One of the most commonly accepted definitions of 'stress' is that it is anything which causes an alteration of psychological homeostatic processes (Selye, 1976). The term stress is applied to the total transaction (Lazarus, 1971, p.54) between the stressor and the coping responses in interaction
together over time so that one may speak of a system being 'under stress' (cf. Selye, 1974, p.32); as well as a particular situation as stressful. In discussing the sources of confusion and controversy in stress research, Mason (1975a, 1975b) observed that physiologists such as Selye, have focussed upon physical and humoral stimuli that mediate stress reactions, whereas behavioural scientists have emphasized the role of psychosocial stimuli. He considers 'stress' to be an intervening variable similar to 'emotion' and 'motivation' (cf. Lazarus et al., 1970; p.209). Attempts to clarify the concept of 'stress' have typically resulted in semantic definitional disputes or in argumentation concerning a specific aspect of vague, complex theory. The field of stress research is still lacking an integrative framework which can explain the majority of research results in a logical theoretical manner (Cooper, 1983).

In sum the field of 'stress' research, prennially replete with competing terminologies, is itself a rich source of intellectual stressor. However, a key point that is generally accepted by stress research is that stress, whether at work or elsewhere, is not an exogenous entity. Rather to modify an honoured aphorism, stress lies in the eyes of the beholder.

2-6.1 Psychological Stress

Although the term 'psychological stress' is frequently used by psychologists and psychiatrists, there
is at present no generally agreed upon definition. However, among those writers whose research deals with behavioural phenomena, there seems to be a fairly high degree of consensus as to the domain of behavioural events to which the term 'psychological stress' refers, even though their definitions are formulated in different ways. For most writers, the term is used as a construct which designates a broad class of events involving interaction between extreme environmental stimuli and the adjustive capabilities of the organism. Although the concept is not vigorously defined, it serves as a useful label for referring to a broad class of psychological phenomena which are likely to have something in common with respect to antecedent casual factors and consequent changes in behaviour. Psychological stress analysis is distinguished from other types of stress analysis by the intervening variable of threat, a state in which the individual anticipates harm. Stimuli resulting in threat or non-threat reactions are cues that signify to the individual, some future condition, either harmful, benign or beneficial. However, some psychological stimuli are stressors, not merely because of their mental load but because of their distribution in time. Information produces a much greater stress response if it is presented at unpredictable intervals than if it occurs regularly even though the density of these stimuli over time is the same (Warburton, 1979).
The key feature of 'psychological stress' that distinguishes it from stress at the social and physiological levels is the presumption that cognitive activities-evaluative perceptions, thoughts, and inferences—are used by the person to interpret and guide every adaptational interchange with the environment. There is elaborate empirical support for the mediating role of cognitive processes in psychological stress (Lazarus, 1966; Lazarus et al., 1970; and Lazarus & Launier, 1978). The general principle seems not to be greatly challenged or in doubt according to most recent writers. However, the nature of the link between cognitive processes, adaptation behaviour, and physiological outcomes remains obscure.

'Situational stress' plays a critical role in evoking differences in drive level of persons who differ in anxiety proneness (A-Trait) and as a variable accounts for the effect of stress on anxiety arousal in research on anxiety and learning. The term 'situational stress' denotes environmental conditions or circumstances that are in some way or the other 'threats' to the ego of an individual. Carron (1971) accurately observes that there are individual differences in state anxiety response to identical stressful environments, and the appraisal of a situation as dangerous or threatening will be determined by individual differences in aptitudes, personal experiences, and personality dispositions (trait).
Different personality characteristics create greater sensitivity to different types of stress, circumstances that involve the risk of failure such as academic achievement situation acts as an ego-threat which becomes a major source of stress (Spielberger & Smith, 1966). Anxiety aroused in experimental situation seems to be mild as compared to the one evoked by natural stress situation. However, it is usually not possible to have a naturally occurring stress situation in the laboratory. Hence, there always remains some doubt about the intensity of anxiety aroused through artificial means.

'Psychological stressors' in the form of ego-involving pre-experimental instructions or failure stress have also been considered along with anxiety levels for studying their single or joint effect on learning tasks like maze learning, serial learning, paired-associates learning, concept formation, etc. (Denny, 1966, Spielberger & Smith, 1966; Nijhawan & Cheema, 1971; Nijhawan, 1972; Sharma & Wangu, 1976; Ravinder, 1977). The effects of failure stress on performance have been shown to be dependent on the nature of learning task by Chatterjee, Bhattacharya and Bhattarcharya (1978). Recently, Srivastava and Naidu (1982) revealed that the perceptual accuracy (based on vigilance task) is greater under moderate ego-stress conditions and lower under high stress conditions.
2-6.2 Physical Stress

A wide range of physical stimuli act as stressors, including exercise, restrain, heat, cold, noise, pain, shock, injury, and infection. All of these can elicit stress responses which are a simple monotonic function of the intensity of the physical stimulus. For mental work the stress response can be just as large as that produced by a physical stress, and can be directly proportional to the amount of information processed per unit time, with the largest responses being produced by information overload when task demands exceed a person's capacities. Bainbridge (1974) has defined information-processing capacity as the processing operations and processing strategies which a person has available. An individual's level of performance will be a function of the processing capacity and the task demands and a person's experience will be important in terms of the processing operations and processing strategies that have been developed. Thus, the stressful effects of work must be seen as an interaction between task demands, the person, and the environmental conditions (Bainbridge, 1974).

The physical environment may have its impact as a stressor either directly or indirectly. Weybrew (1967, p.327) classified primary or direct stressors as those that involve environmental impositions, trauma, which directly strain or stress the adapted capacities of
the neuro-physiological system. Heat and noise appear to induce primarily an autonomic excitability effect. Blood pressure, heart-rate, muscle tensions, and palmar sweating increase following the initial reception of excessive noise or heat.

Since heat is often encountered in combination with some other adverse environment, combined environmental stressors have been commonly investigated (e.g., Poulton & Edwards, 1974). Hartely and Shirky (1977) found antagonistic effects of noise and sleep loss in a test of visual vigilance. The expected effect of noise in reducing judgements of intermediate confidence was cancelled out by sleep loss. Thus, the effects of sleep loss and noise seem to be qualitatively similar but opposite, the alerting quality of noise counteracting the soporific effect of sleep loss.

'Physical stressors' can, of course, have non-physical effects, but when they do, there is generally a conscious identification of the stressor by the person involved, and an awareness of the consequent psychophysiological change. The crucial difference between physical and non-physical stress is that while 'physical stressors' are extrinsic to the organism, non-physical stressors require intrinsic factors of the organism to transform the external elements into significant stressors. (Selye, 1980, p. 21).
Among other factors, anxiety has frequently been considered an important variable determining performance under physical stress or noxious stimulation such as electric shock. The findings have demonstrated that these stress conditions are complex in their effect and interact with a number of variables to determine performance (e.g., Morris & Liebert, 1973; Glover & Cravens, 1974; Eysenck, 1979). Moreover, physical danger does not lead to differential arousal of A-State in subjects differing in A-Trait (Glanzmann & Laux, 1978; Archer, 1979).

Natarajan (1976) used four intensities of shock to create four differential levels of fear in high and low anxious subjects and concluded that amount of fear arousal for the same intensity of threat stimulus is determined by anxiety state. Further, using GSR and RT as measures of fear arousal, Natarajan (1977) showed that the state of effort 'stress' is similar to the state of anxiety or fear with respect to arousal component. Generating three stress conditions with different combinations of a flashing light, electric shock and noise, Naidu and Thapa (1978) found that stressed subjects made more errors in distance judgement, and the error caused by stress increased as the distance judged increased objectively.
To conclude, a major task for a Trait-State Anxiety theory is to specify and determine the characteristics of stressor stimuli (psychological or physical) that evoke differential levels of A-State in persons who differ in A-Trait (Spielberger et al., 1972; Rappaport & Katkin, 1972; Hobfall et al., 1983). Since 'psychological stressors' must be considered with respect to the individual and the stress response is a function of the person's evaluation of the input, the difference between 'psychological stressors' and 'physical stressors' disappears. All 'physical stressors' (e.g., pain) have psychological effects and it is impossible to differentiate them in terms of the psychological stress response (Hockey, 1983, p.205). The research in India in this area has been scant and unsystematic. Comparative studies of the relative effects of physical and psychological stressors on state anxiety and performance on different perceptual and cognitive tasks are needed for persons differing on anxiety, intelligence, impulse control, etc. An intensive psycho-physiological analysis of individual differences in response to stress is also called for.