CHAPTER II
THEORETICAL ORIENTATION: CONCEPTS OF ANXIETY, REINFORCEMENT, TASK DIFFICULTY, AND INTELLIGENCE

ANXIETY

Anxiety has been an important concept in the thinking of mankind since the times of Pascal and Kierkegaard. But not until the beginning of the twentieth century was the concept used in the context of psychological theory. Kierkegaard in 1824 remarks, "One almost never sees the concept of anxiety dealt with in psychology" (cf. Mowrer, 1950, p. 534) (p. 343). Today, in psychological theory, it is very difficult to single out any systematic conception of personality, particularly with regard to its development, which does not give anxiety a role of great significance. For the recognition of its theoretical and practical significance in psychology we are indebted to Freud. About a half a century ago, he singled out anxiety as the nodal problem in emotional and behavioral disorders. Since then, for quite some time anxiety was the concern of only the clinician and a concept of importance only within the framework of psychoanalysis. Now anxiety is an important construct in theories of behavior, ranging from psychoanalysis to learning theories. While studies of anxiety and variables similar to anxiety (e.g., stress) in children have been conducted in a wide variety of theoretical frameworks, including those of Lewin, Festinger, Rotter, and McReynolds, the majority of recent theory-based studies have
used concept or attempted to test hypotheses derived from some version of psychoanalysis or S-R theory.

In a major psychoanalytic work on anxiety, Freud (1933) referred to anxiety as a kind of signal, a premonition of impending danger, an indicator that something is not going well in the life of the affected individual. When the ego is forced to acknowledge its weakness, it breaks out into anxiety. He regarded anxiety as an affective state and described it as a feeling of unpleasure. More specifically, an anxiety state was defined by its three attributes: "(1) a specific unpleasurable quality (2) efferent or discharge phenomenon and (3) perception of these" (1949, p. 70).

Anxiety, according to Freud, could be distinguished from other unpleasant affective states such as anger, grief, or sorrow by its unique combination of experiential and physiological qualities. The experiential qualities consisted of feelings of apprehension, tension, or dread. The physical and behavioural discharge phenomena associated with anxiety were heart palpitation, disturbances in respiration, sweating, restlessness, tremor and the like.

Anxiety, according to Freud, has a traumatic origin: the complex of sensory, motor and physiological experiences which suddenly flood the immature nervous system of the foetus at birth are traumatic. This traumatic state of helplessness, according to Freud, is the prototype of all
later anxiety reactions. The first anxiety reaction is an automatic reaction to the most helpless state in which the human organism will ever find himself.

During the days following birth, the ungoverned automatic anxiety reaction continues to occur in the face of painful new stimuli. But the increasing maturity of the motor and nervous system, and the occurrence of certain kinds of specific experiences, it is not the actual appearance of the dangerous stimulus, but the likelihood of its appearance that precipitates the anxiety reaction. Thus, anxiety acquires a signaling function which warns the individual to use preventive measures before actually experiencing intense pain. The utility of anticipatory reaction to the danger signal was also recognized by Pavlov in the mechanism of simple stimulus substitution (conditioning). However, there is an important difference between the two viewpoints. According to Pavlov, a danger signal comes to elicit essentially the same movement reaction as has previously been produced by actual trauma. According to the conception of anxiety, proposed by Freud, the ego learns to react to this danger signal in various ways which are both constitutionally and environmentally determined. Freud assumes that the reaction to danger signal is an implicit state of tension and augmented preparedness for action, which he calls anxiety. This state of affairs, being a sense of discomfort, may then
motivate innumerable random acts, from which will be selected and fixated those which most effectively reduce anxiety.

Freud postulates objective anxiety, neurotic anxiety, and moral anxiety. He regarded objective anxiety as an intelligible reaction to danger. The danger existing in the environment is consciously perceived and this evokes the reaction of anxiety (objective). In neurotic anxiety, the source of danger is the pressure of id impulses and this source is not consciously perceived as it has been repressed. In moral anxiety, the demands on the ego come from superego. The superego arouses guilt over attainment or anticipation of pleasure and this becomes a source of moral anxiety.

As an affective condition, objective anxiety is the reproduction of an old danger-threatening event; anxiety serves the purpose of self protection as being a signal of the presence of a new danger. According to Kessen and Mandler (1961), whatever the nature of the original anxiety evoker, the central function of anxiety acquires a signaling action which enables the individual to take steps before actually experiencing the trauma.

Freud's notion that anxiety is brought about when the ego receives those external or internal cues that signal helplessness or inability, is mirrored in Karen Horney's concept of basic anxiety. Horney (1937), in her concept of basic anxiety, emphasizes the central significance of the...
Interrelatedness between anxiety and hostility. She has written at length about the relationship of anxiety to neurotic self striving and to sources of insecurity throughout life. She defines basic anxiety as "... an insidiously increasing, all-pervading feeling of being lonely and helpless in a hostile world" (p. 89). The concept of basic anxiety, she holds, "... contends that the environment is dreaded as a whole because it is felt to be unreliable, mendacious, unappreciative, unfair, unjust, begrudging, and merciless" (1939, p. 75). A wide range of adverse factors in the environment can produce this insecurity in a child: direct and indirect domination, indifference, lack of respect for child’s individual needs, disparaging attitudes, lack of reliable warmth, unkept promises, hostile atmosphere and so on. According to this concept, the child not only fears punishment or desertion because of forbidden drives, but he feels the environment as a menace to his entire development and to his most legitimate wishes and strivings. Whenever he expresses his resentment or his accusation, he is discouraged and made to feel guilty. The hostility, which has to be repressed, precipitates anxiety (basic) because hostility is a danger when directed against someone on whom the child feels dependent. In order to keep this basic anxiety at a minimum the spontaneous moves towards, against, and away from others become compulsive. These three attitudes correspond to the elements involved in basic anxiety, i.e.
helplessness, hostility, and isolation.

For Sullivan (1953), anxiety is an intensely unpleasant state of tension arising from experiencing disapproval in interpersonal relations. In the framework of his interpersonal conceptions, Sullivan emphasizes two broad classes of needs. One of these was the need to satisfy biological wants and the other was related to the individual's sense of security. He employed the term euphoria to describe the state of well being and comfort, i.e., security. Conceptually, direct opposite to euphoria is anxiety, i.e., a state of discomfort and insecurity. Among the peculiarities of anxiety is mentioned that, it prevents and hinders the satisfaction of somatic needs.

As regards the origin of anxiety, Sullivan believed that the hostile and rejecting attitudes of the significant person or persons, i.e., mother, nurse, or their surrogates induce anxiety in the infant through empathy. Later on, he is deliberately taught what is right and wrong, good and bad. Training involves the expressions of tenderness and approval or disapproval and withholding of tenderness. Approval increases euphoria and disapproval induces anxiety. The child differentiates between good (need reducing) mother and bad (anxiety provoking) mother. Gradually, as the child starts focusing attention on behaviour which brings approval or disapproval, he starts personifying himself as good me (organization of experiences of approval and tenderness).
bad me (organization of experiences related to disapproval), and not me (organization of uncanny experiences like horror and dread). By and large, the self system is given a form and direction which is maintained throughout life. Any experience, which promises to threaten the form and direction of the self, will provoke anxiety. Thus, Sullivan conceives that anxiety is based ultimately upon the waxing and waning of physiological tensions, but he emphasizes that it develops as the inevitable consequence of the child’s relationship with his mother or other significant adults. The disapproval by the significant people of one’s early life, to which Freud, Horney, and Sullivan refer, is vital enough to account for severe anxieties, because the child is dependent upon these important people for fulfilment of his basic needs.

Golstein's (1939) conception of anxiety as bringing the subjective experience of a danger to existence in the face of failure implies anxiety regarding loss of love and recognition by those who recognize the anxious person's failure. In his view, anxiety is the signal that catastrophe is imminent and catastrophe is the state in which all integrated behaviour collapses and only anxiety remains. Horney (1939) notes that, according to Golstein, what is menaced by a danger provoking anxiety is something belonging to the essence or core of the personality. As there is wide variation in what different individuals feel to be their vital values,
there is also variation in what they feel as a vital menace. Same viewpoint has been expressed by May (1950) when he writes, "The nature of anxiety can be understood when we ask what is threatened in the experience which produces anxiety. The threat is to something in the core or essence of the personality. Anxiety is the apprehension cued off by a threat to some value which the individual holds essential to his existence as a personality." He further holds that situations which evoke anxiety would vary from one person to another, depending on the values on which he depends. Anxiety is, thus, an indirect threat to the person's security as a personality.

Fromm-Reichmann (1955) on the basis of a brief review of the genetic theories of anxiety comments, "At this point I am interested in demonstrating the ubiquitously implied acceptance of the concept that anxiety is connected with anticipated fear of punishment and disapproval, withdrawal of love, disruption of interpersonal relationships, isolation or separation,... In fact, I believe that many of the emotional stress to which psychologists refer as anxiety are states of loneliness or fear of loneliness" (Cf. Stein et al. 1960, p. 132).

Besowitz et al. (1955) define anxiety as the "...conscious and reportable experience of intense dread and foreboding, conceptualized as internally derived and unrelated to external threat" (p. 3). They also posit as
did Freud, that the unpleasant phenomenological qualities associated with anxiety states are consciously experienced. Besowitz et al. note that anxiety has two functional roles—first, as the precursor of the defensive and adjustive processes, and secondly, as the consequence of a breakdown of their integration.

In recent years, anxiety, which was once a concept of clinical interest, has been recognized as a central problem in learning theory. For this appreciation of anxiety as a focal problem in learning theory and scientific formulations thereof, credit goes to such psychologists as Mowrer, Miller and Dollard. They have sought to integrate learning concepts with personality theory and research. These authors accord anxiety a central place in the socialization of the child. This position, which is sometimes referred to as social learning theory, differs little from psychoanalysis in the basic definition of anxiety and in the conception of its origin as an unconditioned response to traumatic stimulation in early infancy. Both social learning theory and psychoanalytic theory emphasize the cue (signaling) function of anxiety and the reinforcing effect of responses which reduce or prevent the experience of this unpleasant affect. As Hilgard (1956) comments, "The conception common to both psychology and learning theory is that a need state is a state of high tension.... What controls the direction of movement is the
tendency to restore a kind of equilibrium, thus reducing
tension" (p. 291). With relation to anxiety, it is essential
to take into account the approach of learning theorists not
because of the amount of research stimulated by them but
also because "there are indications that learning psychologists
and psychologists who emphasize the role of unconscious
processes in personality functioning are coming more and more
to borrow ideas and facts from one another" (Sarason, 1966,
p. 88).

Mowrer, a pioneer in applying learning principles to
personality theory, recast Freud's hypothesis that all
anxiety reactions are learned, in stimulus-response terms
as follows: "A so called "traumatic" ("painful") stimulus
(arising either from external injury, of whatever kind, or
from severe organic need) impinges upon the organism and
produces a more or less violent defense (striving) reaction.
Furthermore, such a stimulus-response sequence is usually
preceded or accompanied by originally "indifferent" stimuli
which, however, after one or more temporally contiguous
associations with the traumatic stimulus begin to be perceived
as "danger signals", i.e., acquire the capacity to elicit an
"anxiety" reaction" (Mowrer, 1939, p. 554).

Though both Freud and Mowrer essentially agree upon
the cue function of anxiety, there is an important difference
in the two, i.e., Freud's theory holds that anxiety comes from
evil wishes, from the acts which the individual would commit if he dared, whereas Mowrer proposes that, "... anxiety comes not from acts which the individual would commit but dares not, but from acts which he committed and wishes he had not" (Mowrer, 1950, p. 537). His theory is a guilt theory rather than an impulse theory. Mowrer believes that anxiety, by virtue of being a source of discomfort may motivate a variety of acts from which will be reinforced the ones which reduce anxiety. He defines anxiety as "... the conditioned form of the pain reaction, which has the highly useful function of motivating and reinforcing behavior that tends to avoid or prevent the recurrence of the pain producing (unconditioned) stimulus" (Mowrer, 1950, p. 17). Thus, he considers anxiety as an instance of secondary motivation and shows its double status as both a product and producer of learning.

Dollard and Miller (1950) also advanced the learning approach to personality, which is compatible with many of the major Freudian concepts. They state that its goal is "... to combine the vitality of psychoanalysis, the vigour of natural science laboratory, and the facts of culture" (p. 3). These authors too reformulated psychoanalytic theory in stimulus-response terms. Anxiety in S-R terms is an acquired or acquirable drive (acquirable because the mechanism of drive is innate). What is acquired is a
connection between stimuli and drives rather than drives themselves. Reduction of anxiety drive constitutes a reinforcing state of affairs, and responses associated with drive reduction tend to be strengthened. Through learning, stimuli which were previously neutral may take on the anxiety arousing properties of original stimuli which aroused anxiety. Dollard and Miller also stress that anxiety serves as cue to elicit responses that have previously been learned in other frightening situations. Anxiety may be called in the language of Miller and Dollard (1941) a stimulus-producing response, i.e., it is a response which may produce stimuli which have drive value and cue value.

In general, although anxiety has been a concept of great importance in social learning theory in explaining the personality development of the child, it has rarely been studied as an independent or dependent variable in research conducted within this particular framework. However, "the study of learning in relation to individual differences seems a fruitful direction for research, particularly because of the lack of a direct approach to learning in psychoanalytic orientations (I.G. Sarason, 1966, p. 88).

Following the lead of social learning theorists, a systematic and comprehensive programme of research in the field of anxiety was developed by Sarason and his colleagues
(1960). They have combined with the psychoanalytic viewpoint, the vigorously logical and testable form of learning theory. These investigators derived a series of hypotheses and predictions regarding the unconscious significances and behavioural correlates of anxiety in a specific situation, i.e., evaluative test situation. This specific form of anxiety regarding the test situation is named as test anxiety. These authors, following Freud, Horney, and Sullivan, have been able to trace the determinants of test anxiety in the early childhood experiences of the individual in home and school. The behaviour of every child, they assume, is continually and explicitly evaluated by parents and their surrogates as good or bad. The unconscious significances of test anxious reaction concerns the child's experience in these test-like situations in the family. The evaluations by adults elicit in him the hostility, which cannot be satisfactorily expressed. When the attempts to defend against the expression of hostility are unsuccessful, they give rise to the upsetting experience of guilt. The concurrent conscious experience of hostility and guilt makes it likely that the child develops self derogatory feelings, as is the case with the test anxious child, in situations in which judgement is being passed on his adequacy. Later on, in the school, the teacher is perceived as an authority figure (like the parents at home) because there are stimulus contexts which have varying degree of
similarity to those involving parents. Thus in the school situation, evaluative characteristic of the teacher becomes a stimulus for the arousal of test anxiety. Besides the stimulus similarity, there is the possibility that response similarity increases the number of situations in which the anxious reaction appears. Whatever elicits hostility may become involved in the development of anxiety symptoms, even though it is not a test-like situation. Here, the hostile thought towards the other person becomes associated with the expression of hostility as a dangerous and anxiety arousing experience. Thus, Sarason et al. (1960) conceive anxiety as a response to situation cues (danger signal) which produces a strong stimulus which is denoted by the term drive (SD).

Handler and Sarason (1952) assume that anxiety is a learned drive which is a function of anxiety reactions previously learned as responses to stimuli similar to testing situation. Anxiety is considered as a response-produced strong stimulus with the functional characteristic of drives as discussed by Miller and Pollard (1941).

The test anxious child is characterized as dependent, unaggressive, and self derogatory in test-like situations (Sarason et al., 1960, p. 15). In order to measure the children's attitudes and experiences in a testing situation, Sarason et al. have developed the Test Anxiety Scale for
Children¹ (TASC). The parallel form for use with college students is called TAQ. A higher score on the anxiety scale means higher proneness for the arousal of anxiety in the testing situation. Reactions to reduce the anxiety drive would be either task relevant or task irrelevant. Whether anxiety would facilitate or interfere learning would depend on what type of reactions are evoked by anxiety drive (Sarason, Mandler, and Craighill, 1952). Ruebush (1960), working along with Sarason emphasized that the effect of anxiety on performance is mediated primarily by defense reactions (cautiousness) to anxiety. He further states that in problem solving situations where such defensive reactions are a liability, anxiety has an interfering effect on performance. When cautiousness is rewarded, anxiety in the high anxious child is minimal or absent and the performance of the child is not interfered.

Another group of researchers have attempted to test hypotheses introduced by Spence (1956) and Taylor (1956), which emphasize the motivational rather than the signaling properties of anxiety. The theory of emotionally based drive, advanced by these authors is based on Hull's basic assumption that a learning factor (H) combines multiplicatively

¹General Anxiety Scale for Children (GASC) has also been developed by the same authors, as a measure of general anxiety.
with a generalized drive \( (D) \) factor to determine excitatory potential \( (E) \). Thus \( E = f (H \times D) \). They further assume that in the conditioning situation the drive level \( (D) \) is a function of the magnitude of a hypothetic emotional response \( re \) (anxiety), aroused by aversive stimuli.

The Manifest Anxiety Scale (MAS) was devised by these authors as a measure of the emotional responsiveness which, in turn, indicates the level of drive \( (D) \). Children's form of the Manifest Anxiety Scale has been developed by Castaneda et al. (1956). Taylor, Spence and others working in this theoretical framework have been able to prove the hypothesis that in instances in which the initial habit strength of the correct response is stronger than the strength of the competing responses, performance should be positively related to drive level; and if the correct response is weaker than the competing response tendencies, higher drive level would lead to poorer performance.

Some investigators have found it useful to distinguish between anxiety as a trait variable and anxiety as a state variable. Spielberger (1966) has postulated the trait-state conception of anxiety as based on the factor analytic studies of Cattell and Scheier (1958) who report two distinct anxiety factors, i.e., trait anxiety and state anxiety. Anxiety as a personality trait is described as a motive or acquired behavioural disposition that predisposes an individual to
perceive a wide range of objective non-dangerous circumstances as threatening. State anxiety is conceived as a complex, relatively unique emotional condition or reaction (feelings of tension and apprehension) to a stimulus situation which is cognitively appraised as dangerous or threatening. With regard to learning situations, it has been predicted and proved that subjects who are high on A-trait will be high on A-state (under stressful situations) than those who are low on A-trait; and also that A-state will affect learning more than A-trait.

Sarason describes a high test anxious child as one who has self-depreciatory attitudes, anticipates failure in the test-situation in the sense that he will not meet the standards of performance of others or himself. At the same time, he considers test anxiety as a predisposition to become anxious in the face of certain situational cues. Ruebush (1963), on the basis of Sarason et al. (1967) states, "...anxiety may be expected to be aroused reliably in some but not all children, if, and only if, they are exposed to a situation with evaluative components" (p. 463). In view of this very explicit statement by Ruebush about the arousal of anxiety, it is a little difficult to comprehend Spielberger's concept of state anxiety.

The brief review of literature regarding the concept of anxiety shows that anxiety is a broad complex phenomenon.
Different experimental investigators have tackled its various aspects. Though there is no single concept of anxiety yet it has been generally agreed upon that it is a most unpleasant interference with thinking process and concentration, a diffuse, vague and frequently objectless feeling of apprehension or a discomforting feeling of uncertainty and helplessness. Mandler (1968) has presented the integrative view on anxiety. He notes that there is consensus that anxiety is a mediating experiential phenomenon related to the perception of impending threat, or overstimulation or unmanageable demands and that is accompanied by discharge in the sympathetic nervous system. Thus, in very general terms, anxiety may be defined as a reaction of apprehension ranging from uneasiness to panic, preceded by a real or symbolic condition of threat. Anxiety is a complex of many emotions as distinguished from anger, fear, or grief.

The present investigation, as has already been mentioned in the previous chapter, has made use of Sarason's concept of test anxiety. The hypotheses of the study regarding the effect of anxiety on learning have been derived from the Sarasonian theoretical framework.

The early Greek philosophers and the later British associationists described the laws of antiquity, similarity,
frequency and recency, but did not find it necessary to relate reward and punishment to the formation of associations. The reward and punishment problem arose in learning psychology only after the pleasure-pain views began to find favour at the end of the last century, in the philosophies of Spencer (1880) and Bain (1870). However, the concept of reinforcement, as we think of it today, dates back to Thorndike's law of effect, which provided hedonistic explanations of learning.

Following his experiments on cats, in a simple instrumental learning situation, Thorndike (1911) announced what he called the laws of effect and exercise as basic principles of learning. The former, which is of vital significance in education, stated in his own words is as follows: "Of several responses made to the same situation, those which are accompanied or closely followed by satisfaction to the animal will, other things being equal, be more firmly connected with the situation, so that, when it recurs, they will be more likely to recur. Those which are accompanied or closely followed by discomfort to the animal will, other things being equal, have their connection with that situation weakened, so that, when it recurs, they will be less likely to occur. The greater the satisfaction or discomfort, the greater the strengthening or weakening of the bond" (1911, p. 244). By a satisfying state of affairs he meant one which the animal does nothing to avoid, and which he often tries to preserve or attain. By discomfort
and annoying state of affairs is meant one which the animal commonly avoids or abandons.

In simple words, this law means that rewards or successes further the learning of rewarded behaviour, while punishment or failure reduces the tendency to repeat the behaviour leading to punishment or failure.

Later on, in a number of experiments with animals, Thorndike found that the effects of reward and punishment were not equal and opposite, as had been implied in earlier statements of the effects of satisfiers and annoyers. Reward appeared to be much more powerful than punishment. Same results were reported in experiments with children in which 'right' was used as reward, and 'wrong' as punishment.

However, it was pointed out by other experimenters, Holodnak (1943), Stephens (1954) that the appropriateness of the term punishment for the description of an effect which is primarily informative may be questionable. 'Wrong' in such cases could serve merely a signal for substituting one arbitrary guess for another. The prediction of the desired response to be made by the subject is difficult. This is specially true when weak associations are used (which Thorndike and his associates have been charged with). In case of reward, however, it is apparent to the subject that the repetition of the rewarded response will again be rewarded.

As regards the question as to how the law of effect
works, Thorndike's statement was usually interpreted to mean that some events are reinforcers because they are satisfiers. Hull (1943) tried to remove the element of subjectivity and pleasure reference by translating the law of effect into his own law of primary reinforcement, which reads as follows: "Whenever a reaction (R) takes place in temporal contiguity with an afferent receptor impulse (s) resulting from the impact upon a receptor of stimulus energy (S) and this conjunction is followed closely by the diminution in a need [and the associated diminution in the drive (D)], and in the drive receptor discharge (JD), there will be result in increment, \( \Delta (s \rightarrow R) \), in the tendency for that stimulus on subsequent occasions to evoke that reaction" (p. 71).

It implies that for Hull, primary reinforcement amounts to drive reduction and the amount of learning is related to the amount of drive reduction. But this theory fails to explain the role of many rewards which are not connected with biological needs (e.g., social approval). Another criticism leveled against Hull's theory is by Sheffield and Roby (1950) who demonstrated that saccharine which has no nutritive value, served as reinforcement satisfactorily with hungry rats. Further doubts were raised by analogous experiments in which food was used but prevented from reaching the stomach and hence from reducing drive.
Later on, Hull was influenced by Miller's experiments on acquired motives and his conclusion that drives, whether primary or acquired, gave rise to internal stimuli and that it was the reduction of these drive-produced stimuli that was reinforcing. So, he modified his theory, accepting the idea that reinforcement involved drive stimulus reduction rather than direct need reduction and that, learning was a function of the number of reinforcements rather than the amount of drive reduction. He also gave greater credence to acquired drives and secondary reinforcement. Learning by punishment was explained by Hull in terms of escape from punishment as reinforcing. To end the punishment was conceived as rewarding.

In his last publications (1951, 1952), Hull was, however, influenced by Tolman's viewpoint that reinforcement may help learned responses but learning itself can take place without it. He was also convinced about the distinction between performance and learning, which Tolman demonstrated on the basis of experiments in latent learning. Hull also believed that reinforcement is essential for performance and not for learning.

Guthrie (1935) concluded that rewards have nothing to do with learning. He believed that rewards simply prevent the animal from unlearning what it has already learned by keeping it from reacting in other ways to the
stimuli that lead to the response. Food at the end of maze, according to Guthrie, keeps the animal there instead of allowing it to wander through the maze, unlearning proper turns to save blind alley.

Tolman (1938) advanced what he calls a purposive theory of learning. This theory emphasizes that learning consists of associations between signs and meanings or significants. He believed that appearance of a reinforcing agent simply confirms the expectancy aroused by the sign. For Tolman, rewards represent only some kind of objective indications that some signs are followed by certain special meanings. In his experiments on latent learning, Tolman was able to demonstrate that reinforcement may help performance, but not learning.

Mowrer (1940c), an advocate of drive reduction theory, was the first one to examine the hypothesis that just as a reduction in thirst, reduction in hunger, reduction in oxygen lack, or reduction in any other organic need or discomfort tends to reinforce behaviour which brings about such a reduction or state of relief, so likewise a reduction in the particular form of discomfort called anxiety is effective in fixating behaviour that is associated therewith. He conceived anxiety a secondary drive and its reduction as secondary reinforcement. Mowrer, in series of papers (1938, 1939, 1940a, 1940b, 1941)
advanced evidence that all learning is dependent upon the occurrence of a state of affairs which has been variously designated as goal attainment, problem solution, pleasure, success, satisfaction, gratification, re-establishment of equilibrium, motivation reduction, and reward. However, Rice (1946) and Allport (1946) directed criticism against Mowrer's view that living organisms learn when and only when they solve a problem in the sense of reducing a tension, relieving a discomfort, deriving satisfaction. This criticism forced him to give dualistic conception of learning, i.e., there are two forms of learning — problem solving and conditioning. The former refers to the acquiring of solutions to the problems (including the development of those overt responses which are fear reducing) learned through trial and error and the law of effect; the latter pertains to the process whereby emotional learning takes places or the secondary drives are acquired and the law of effect is not adequate to account for this learning. The term conditioning is used to explain this process. Thus, Mowrer maintains that the reinforcement in classical conditioning is not need reducing, while such reinforcement is usually necessary to provide instrumental or operant behaviour.

"Miller and Dollard, comments Hilgard (1948), have succeeded better than anyone else to date in giving, an informal exposition and homely illustration the gist of a theory substantially in agreement with Hull's principles"
In their theory of social learning, Millar and Dollard (1941) have put forward the four fundamentals of learning, i.e., drive, response, cue, and reward. Drive, according to the authors, is a strong stimulus which impels action. Some drives are primary or innate, such as pain, thirst, hunger, or sex. Some are acquired or secondary drives, such as anxiety, appetite for special food, desire for money, and social approval. Responses are elicited by cues which determine when, where, and how the organism will respond. Responses made to cues in the presence of drive will be learned if they are rewarded or reinforced. Reinforcement provides reduction in drive and strengthens stimulus-response connections. The authors further believe that once it has been discovered that a given event, such as receiving praise from the mother, can be used as reward to strengthen a given stimulus-response connection, it can be assumed that this same event can be used as reward to strengthen other stimulus-response connections. Here the drive is probably some form of anxiety or drive to please the mother. In connection of praise as reinforcement, they refer to acquired or secondary rewards. Just as anxiety is an acquired drive, relief from anxiety is an acquired reward. Social approval and punishment acquire the reinforcing value in the course of socialization of the child. Social approval or praise is associated with reduction of anxiety and thus serves as reinforcement. The role of punishment
is indirect. Dollard and Miller (1950) offer an account that punishment results in the arousal of fear which is conditioned to the stimuli which formerly aroused now-punished response. The organism now engages in avoidance behaviour which reduces anxiety and the reduction of anxiety reinforces the behaviour of withdrawal.

Besides the drive reduction theories of reinforcement there has also been advanced the stimulation theory of reinforcement (Olds and Milner, 1954). According to this theory, there is a particular system of the brain which is stimulated and this activation serves as reinforcement. Furthermore, Young and Shuford (1954) believe that certain things are reinforcing because they have the right kind of sensory consequences and not because they satisfy some biological needs. According to them, food is reinforcing due to its taste and water due to the stimulation aspects of drinking. In support of their position, however, Miller and Kessen (1952) demonstrated that rats learned a simple discrimination for a reward provided by the introduction of food directly into the stomach by way of a fistula. Such learning took place in the absence of taste stimulation. This appears to leave the alleviation of hunger as the only remaining mechanism of reinforcement.

The modern view of reinforcement (Collier and Myers, 1961) is that reinforcement entails a variety of mechanisms, probably all of those emphasized by the more specialized
theories of reinforcement. There is also increased appeal of the two process theory which maintains that mechanisms of reinforcement are different for classical conditioning and instrumental learning. The position is that instrumental learning encounters reinforcement provided by tension-reduction, whereas for classical conditioning, all that is necessary is the contiguous occurrence of conditioned and unconditioned stimuli.

Whether the explanation lies in the reduction of drive or in a change in the stimulus conditions associated with the termination of behaviour, or in an increment to the probability of a repetition of the behaviour, as the more sophisticated application of modern statistical learning theory suggests (Estes, 1959), reinforcement has both a theoretical and practical role in learning.

In the school learning situation, the role of reinforcement has been well recognized. However, in the school learning situation, secondary reinforcement plays much greater a role than primary reinforcement. The goal objects are those which would not have reward value in themselves except for what they stand for. School marks, ranks, approval by the teacher, derive their reward value from such learned motives as the desire for prestige, recognition, reduction of anxiety and so on. Punishment is variously treated. But there is a tendency to subsume the action of punishment under that of reward. This is possible because escape from
punishment is rewarding.

The concept of reinforcement used in the present research is the one advanced by Mowrer (1939), and Miller and Dollard (1941). Praise has been used as reward and reproof as punishment. It is assumed that praise and reproof are directed at the ego and the security motive of the child, since he wants not only a sense of achievement but also wants these accomplishments to be admired by others. Approval or praise should result in the learning and fixation of the correct responses, while punishment or reproof would cause a sense of deflation and would eliminate the incorrect response.

As regards the relative effectiveness of praise and reproof on learning, the findings reported in literature are not unequivocal. This makes it very difficult to make broad generalization as to which is more effective — praise or reproof. Lately, there has been an inclination to believe that the differential effects of praise and reproof occur in relationship to the personality of the recipient and one of the important personality factors in this connection is the anxiety level of the person. Failure or blame may be harmful for persons who are high on anxiety but may be beneficial for those who fall on the lower side of the anxiety. Sarason, Mandler and Craighill (1952) state, "When a stimulus situation contains elements which specifically arouse test or achievement anxiety, this
increase in anxiety drive will lead to poorer performance in individuals who have task irrelevant anxiety responses in their response repertory. For individuals without such response tendencies, these stimulus elements will raise their general drive level and result in improved performance" (p. 561).

Sawrey and Talford remarks likewise, "The addition of increment of anxiety to those who are already chronically high in anxiety level leads to increased drive resulting in disorganization and performance decrement. The addition of increment of anxiety to those who are relatively low in anxiety may result in an increased drive level that is more nearly appropriate to the task. In such cases performance should improve" (p. 297).

The present study intends to study the relationship of reinforcement to anxiety, task difficulty, and intelligence, as it affects learning.

TASK DIFFICULTY (In Relation to Paired Associate Learning)

Since the beginning of psychologist's interest in learning and memory, verbal materials have been used for research purposes. Ebbinghaus, who in 1885 published the first experimental study of memory, occupies an undisputed position as a classic in the field of learning. He set out to show that higher mental processes such as memory could be studied under strictly controlled experimental conditions and that they could be precisely measured. In an effort to
develop standardized material that could be used interchangeably in a wide variety of learning tasks, he devised nonsense syllables, each of which consists of a vowel between two consonants and does not form a real word. These, he argued, were devoid of associations and meanings.

However, the subsequent history of experimentation with nonsense syllables showed that Ebbinghaus expected too much of them. They have been found to be varying in their resemblance to English words and hence their meaningfulness. For this reason, several investigators have calibrated nonsense syllables in terms of their association values (Glass, 1928; Hull, 1933). Such scaling has resulted in classification of nonsense syllables according to the degree of meaning and familiarity. In the last two decades a large amount of work by psychologists has centered on the assessment of the effects on acquisition and retention, of the associative hierarchies that are developed through linguistic usage. The method of free association and related normative techniques have been used to determine the structure of association characteristics of nonsense syllables (Noble, 1952; Mandler, 1955; Archer, 1960).

While nonsense syllables are highly useful for many kinds of experiments, meaningful words were also used by Ebbinghaus and continue to be used frequently in studies of verbal learning. A large number of studies have been designed to find out what responses do occur to specific
words and the associations values are found in terms of frequency of occurrence. Among these studies are those by Russell and Jenkins (1954) and Castaneda et al. (1961). Learning tasks, constructed on the basis of association values are used to evaluate the influence of pre-existing associative pattern on the formation of new verbal habits.

A variety of methods have been used to study verbal learning, using either nonsense syllables or meaningful words. Most prominent of all are the two methods, viz. serial learning and paired associate learning. The serial learning method involves the presentation of a series of words one after the other in set order over and over until the subject is able to anticipate each word in the list before it is shown to him. Each item serves as a stimulus for the recall of the next item, and a response to the preceding item. This arrangement makes it difficult to separate the function of stimulus and response in the learning process. Moreover, intralist interference due to such factors as remote associations is an inherent part of serial learning, and it is difficult to specify the number and strength of the response tendencies elicited by each stimulus.

In order to avoid the complications of serial learning, psychologists have used the method of paired associate presentation to study the learning process. In this method, pairs of items are presented to the learner. He is instructed to learn the pairs in such a way that when first member of
the pair appears, he is able to recall the second. Thus the first member of the pair is a stimulus and the second member serves as response item. The pairs of stimulus and response items are presented in a random order which is different for every trial. This is to avoid rote learning.

This method is commonly viewed as representative of the things people do when they learn verbal materials under ordinary conditions e.g., the learning of vocabulary of foreign words by traditional method of translation. Furthermore, it is the model example of the associative process in which one item of a pair serves as a stimulus for the response which is learned. This type of learning is very much in line with the contemporary psychological theory which describes learning as the process of acquiring new responses to stimuli. The stimuli are sometimes events in the external world and sometimes internal events, i.e., thoughts and ideas which prompt us to respond in a particular way. Therefore, the study of discrete associations as in paired associate learning has had important theoretical importance.

The analysis of the components of the paired associate task makes it useful to conceive of the total acquisition period into two successive stages, namely, the response learning stage and the associative stage (Underwood and Schulz, 1960 pp. 92-94). During the former, the prescribed responses are established as integrated units available for performance; during the latter, the responses are linked
to the appropriate stimuli. A series of experiments by Underwood and Schulz (1960) show that a particular response may be very readily available (and hence easy to learn in the first phase), the same response may be extremely difficult to associate with some particular stimulus. In fact, these experiments show that such variables as association value and frequency are very important. The associative strength between the stimulus and response items has been found to be accounting for the ease and difficulty in paired associate learning. "A difficult task", according to Deese (1956), "is generally one that takes us a relatively long time to learn" (p. 204). He also mentions that since other conditions like the ability of the learner, his motivation, the amount of preceding practice influence the length of time spent in learning, it is not possible to equate difficulty with the length of time or number of trials it takes the learner to reach criterion. However, a change in task difficulty may be defined, in case the above mentioned factors are controlled and some aspect of the task is varied in such a way that the time to reach the criterion is changed.

In paired associate learning, other factors kept constant, the progress in learning has been found to be much dependent on the association strength between the stimulus and the response. In case, the response words are highly associated with the stimulus words, the task is reported to be easier (taking shorter time to learn) than
the list of pairs in which the stimulus and response associations are very low. This is because the highly associated response is available in the subject's repertoire, while in case of the pairs with low association values, the response is not easily available in the response repertoire of the individual. According to Postman (1968) too, progress in paired-associate learning depends on the extent to which the following requirements are met: "(a) the stimulus terms "... are differentiated from each other; (b) the prescribed responses are available as integrated units in the subject's repertoire; and (c) stable associative connections are developed between the appropriate stimulus and response terms". Noble and McNeely (1957) have also noted that associative potential of verbal pairs is an important determinant of ease of learning in paired-associate learning. Peterson (1956), in what might be called a selective learning of paired associate situation, found acquisition rate to be directly related to the frequency of response in the Minnesota word association norms (Russel and Jenkins, 1954). Castaneda et al. (1961) obtained word association norms for 70 adjectives and on the basis of the same, they prepared two lists of paired associates, one with pairs of high initial associative strength and the other with pairs of low associative strength. They found a direct relationship between acquisition rate and strength of association between stimulus and response members, i.e., the pairs of high association values were learned faster than those with low association values. McCullers (1961)
confirmed these findings. Shapiro (1965) also reported that fewer trials to criterion were required for pairs of high than for low initial associative strength. Wicklund et al. (1964) based their lists on norms, for fourth grade children, obtained by Palermo and Jenkins (1964). The rate of acquisition in their experiments was related directly to initial strength of associations between stimulus items and response items. Underwood and Schulz (1960), and Epstein (1962) and Levitt also report similar findings. The fifteen pairs of Adams and Vidulich's (1962) lists consisted of nouns for which the adjective response members were congruent or incongruent. Congruent can be interpreted as high associative strength and low congruent as low strength of association between stimulus items and response items. The former lists were learned faster than the latter lists.

Some psychologists have prepared the competitive and noncompetitive lists as difficult and easy paired associate tasks, based on the associative strength between paired words. Spence and Co-workers (e.g., Bosch, 1959; Sherman, 1957; Spence, Farber and McFann, 1956; Spence, Taylor and Ketchel, 1956) have used Haagen's (1949) norms for the strength of association of paired adjectives to construct noncompetitive and competitive lists. The stimulus members and response members of the noncompetitive lists were selected so that the stimulus members and response members of a particular pair had ratings of high associative strength.
but neither was associated strongly with any other stimulus member or response member. Intralist associations on the basis of meaning were minimized as was formal similarity. In the competitive lists the stimulus members of the pairs were strongly associated to the response members of the other pairs and weakly associated with the response members with which they were paired. Also, stimulus members of strongly associated and weakly associated pairs were synonyms so that each might be an associate of the others. The experiments using these lists showed that noncompetitive lists were learned more rapidly than the competitive lists. Within the competitive lists, pairs with high associative strength were learned faster than pairs with low associative strength between the stimulus and response items. Lovaas (1960a) used five pairs from Haagen's list with high strength of association between stimulus and response words and five pairs with low strength of association. Subsequently (1960b) he used Spence, Taylor and Ketchel's competitive lists. In both the experiments, pairs with high associative strength were learned faster than those with low associative strength. Therefore, disregarding the arrangements of associations of the competitive lists, the results of these experiments suggest that strength of association between stimulus and response members is directly related to acquisition rate, which is an index of the ease and difficulty of a learning task.
Keeping in view the experimental findings, the present study has used the associative strength between the stimulus items and response items as the criterion for the difficulty of the task. Two lists (one easy and one difficult) have been prepared and used. The easy list consists of 12 pairs with high associative strength and the difficult list includes 12 pairs of low associative strength between the stimulus and response items. More details of the paired associate lists, used in the study, are given in Chapter IV.

INTELLIGENCE

Since the beginning of this century, when Binet developed the intelligence test scales, the study of individual differences in intelligence has continued to be the most important and wide spread of psychological testing. Studies in this sphere have, however, failed to produce a unanimity of opinion regarding the concept of intelligence.

In very general terms, intelligence refers to the ability or capacity of an individual by virtue of which he acts in a manner which is different from others. The most fundamental concept by which to judge this functional significance of behaviour, is probably that of adaptation or adjustment of the individual to his total environment. However, we must discriminate between adjustment by routine behaviour and behaviour which is, to some degree, novel. So, according to this concept, intelligence refers to general
mental adaptability to a novel and complex situation. The quality of adaptability, along with judgement and reasoning, has also been emphasized by Binet. Intelligence, says Binet (1905), "... is judgement, otherwise called good sense, initiative, the faculty of adapting one's self to circumstances. To judge well, to reason well, these are the essential activities of intelligence" (p. 196).

Another type of definition states that intelligence is the ability to learn. Still others would confine the concept of intelligence to what is generally called intellectual, i.e., abstract thinking. This, however, seems an arbitrary restriction of the term.

In fact, these concepts of intelligence are supplementary rather than contradictory emphases, each pointing to a different aspect of intelligent behaviour.

Comprehensive definitions have been presented by Wechsler (1943) and Stoddard (1943). The former states, "Intelligence is the aggregate or global capacity of the individual to act purposefully, to think rationally and to deal effectively with his environment" (p. 3). This definition encompasses all the above mentioned. Although learning ability is not mentioned, it is surely implied. Stoddard has offered the following definition: "Intelligence is the ability to undertake activities that are characterized by (1) difficulty (2) complexity (3) abstractness (4) economy
(5) adaptiveness to a goal (6) social values, and (7) the emergence of originals, and to maintain such activities under conditions that demand a concentration of energy and a resistance to emotional forces" (p. 4). The author has made the concept very wide. Stoddard's last two conditions of intelligent behaviour — "concentration of energy" and "resistance to emotional forces" are, however, subject to criticism. The tests of intelligence do not directly measure these attributes.

Psychologists have attempted to clarify the concept of intelligence inductively from the study of data resulting from the application of the tests designed to measure intelligence. The structure and nature of intelligence have been inferred by way of subjecting the data to factor analysis and multiple correlations.

Thorndike (1927) and Thomson (1939) have considered intelligence as a composite of a large number of highly particularized abilities. Spearman (1927) was of the view that the communality or common variance among tests, involving a wide variety of cognitive performances could be accounted for by one single general factor (g) running through all the tests, supplemented by a different specific factor(s) for each test. Later on, Thurstone (1938) and Guilford (1959) found that it was necessary to postulate additional group factors, such as factors of verbal ability, numerical ability, spatial visualizing, reasoning etc. The general
factor has been introduced by these authors as the "second order factor" expressing the relationship between group factors. It is this nucleus of relationship between a wide variety of tasks that provides the psychometric basis for a concept of general intelligence and justification for using a single score to express individual differences along this dimension.