Chapter II.

ANXIETY AND PERFORMANCE
-SOME THEORETICAL FORMULATIONS
CHAPTER 2

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CHAPTER 2

ANXIETY AND PERFORMANCE:
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2.1 Purpose of Theory

Most people know that the purpose of a theory is to explain the existence of an observable phenomenon whose cause is not yet fully known. If there were no other restrictions on theorizing, a theory would be indistinguishable from an opinion. A theory in science must be more than just a belief. It must also have certain properties: (1) The phenomenon being explained should be capable of being measured objectively; (2) The theoretical statement should be based on known facts in a logical manner and (3) The theory must permit the deduction of new hypothesis which can be tested experimentally.

In psychology it is conventional to break down the study of human behaviour into areas like perception, motivation and learning. This should not be permitted to obscure the fact that human behaviour is unitary. Nevertheless, theorists place varying emphasis on different areas of investigation. Psychoanalysts, for example, are preoccupied with motivation and scarcely concerned with learning. The study of learning and the formulation of theories of learning have been largely the work of experimental psychologists. It is not surprising, therefore, that the literature does not reveal a psychoanalytic position on the effect of anxiety on learning and performance. Nor it is surprising that the few theories which are sufficiently worked out to be considered seriously have come from experimental psychology.
2.2. Anxiety as an Energizing Drive:

A great deal of experimental work dealing with the effect of anxiety on learning has been carried out at the University of Iowa under the direction of Kenneth W. Spence. The Iowa studies, like those of Dollard and Miller were influenced by the theorizing of Hull, but there are some divergencies and elaborations.

Spence (1958, 1964) conceives of anxiety as an acquired drive which has the capacity to generally energize the organism. Anxiety ought thereby to facilitate the performance and increase the speed of learning. Taylor (1952) developed Manifest Anxiety Scale (MAS), a self-report inventory to measure the level of anxiety. The score on MAS indicates the anxiety score of the individual.

Spence's theory is straightforward when applied to learning situations in which only one response is possible and occurs invariably as in the case with the conditioning of a reflex, like eyelid reflex. The individual either responds to the conditioned-stimulus with the reflex act, or he does not respond; there is no choice of responses. In this kind of situation a high anxiety level should, by energizing the individual to behave, facilitate learning. Spence's theory is presented in figure 2.1.

The one-response learning situation does not occur frequently in human life. In most learning circumstances, a variety of possible responses is available to the individual. Each of these response tendencies or 'habits' has a certain strength of probability of
FIG 2.1 SPENCE'S THEORY OF LEARNING

occurrence, depending upon the individual's past experience. These responses could theoretically be arranged in a hierarchy of habit strength.

Spence's theory holds that anxiety will energize or strengthen each of the habits in the hierarchy in proportion to the critical strength of the habit. The relationship is multiplicative and can be described by the following formula:

\[ \text{Behaviour} = \text{Drive} \times \text{Habit} \]
\[ = \text{Anxiety (Drive)} \times \text{Habit} \]

In some learning situations the correct response tendency will initially rank high in the hierarchy for most people. Suppose, that the task is to learn to associate the word 'low' with stimulus word 'high'. Most people have been exposed to other associations with the stimulus word, like high mountain, high light etc. But the association with 'low' has doubtless occurred many more time in the past and thus has a greater habit strength. Anxiety will energize the correct response to a greater extent than it will to the incorrect ones and thus increase the speed of learning.

This particular learning task is evidently a simple one. To define a 'simple' task is to say that for most people the correct response initially ranks high in the habit hierarchy. A 'complex' situation is one, in which there are a number of competing response tendencies. (1) On simple learning tasks those subjects high in anxiety (HA) will perform better than those subjects low in anxiety (LA). This finding is consistent with Hull's Drive theory in that,
for easy tasks there are relatively few incorrect or competing responses. Thus the higher drive level for high-anxiety subjects multiplies with higher strength for the correct response and thereby facilitates performance. (2) On more complex tasks, the performance of HA subjects is generally inferior to LA subjects particularly in earlier stages of learning, but such performance may improve and even become better than the performance of LA subjects in later stages. Consistent with the drive theory, it is assumed that the correct response is initially weaker than the competing ones on more complex tasks and that high drive activates more response error tendencies thereby leading to performance decrements.

2.3 Criticism of Spence's Theory:

The critics say that MAS is not a real measure of anxiety but a measure of social desirability. Spence's whole theory is based on MAS only. Edwards (1957) developed a 39 item test of social desirability and found a correlation of -.84 between the scores on MAS and scores on his social desirability scale. This high negative correlation indicates that the MAS may be considered as a measure of social desirability (undesirability). Thus, individuals obtaining high scores on MAS may be described as individuals who tend to respond to items on personality test in an undesirable way.

Secondly, Saltz (1970) questioned the interpretation of MAS as a measure of anxiety. Individuals who score differently in MAS, which he says, may not differ with respect to anxiety but, rather to the kind of stress to which individuals are sensitive. Subjects
who score high on MAS are assumed to be sensitive to stress induced by failure, and fear of failure. Subjects who score low on MAS are assumed to be sensitive to stress induced by pain. Subjects low in anxiety show poor performance in eyeblink conditioning because pain elicited by unconditioned stimulus disrupts performance.

Kaminsler-Trapp (1959) stated that, other drive variables would influence performance on these tasks in the same way as scores on MAS. But there is no empirical finding that MAS has simultaneously sought to establish what the effect of differences in drive would be in any given task and MAS as a measure of drive.

Third inadequacy central to Hull-Spence theory of drive is, the assumption that different sources of drive combine additively, i.e. the level of drive present in any given situation is not determined solely by any single source of drive but by combined effect of all sources of drive.

Finally, it should be noted that, Spence's theory does not deal with a large number of issues relating to anxiety. Spence does not deal with defense mechanisms such as repression, displacement. His theory represents an attempt to deal with limited aspects of concept which has many ramifications.

2.4. **Anxiety as a Situationally Determined Reaction**

( The Yale Theory )

The Yale theory was advanced by Mandler and Sarason (1952, 1960). Anxiety is a strong learnt drive which is situationally
evoked. A particular circumstance or a class of circumstances may be stressful for a person though he is not made anxious by other situations. Individuals may react differently to the same circumstances.

The individual has learnt or developed characteristic responses to anxiety which he brings with him to the current situation. These reactions may be task-irrelevant that is tending to disrupt performance, i.e. feelings of inadequacy, fear of failure, desire to quit the situation or they may be task-relevant or facilitative of performance because they move the person to reduce anxiety by completing the task successfully.

The effect of anxiety is also a function of such aspects of the situation as the attitude of the experimenter and the meaning of task as perceived by the individual. These factors are of greater significance than complexity or difficulty of the task.

According to Yale theory the study of anxiety should begin with examination in depth of particular stressful situation, not achieving, not accomplishing, not performing upto a standard which is regarded as highly undesirable. Many specific situations might evoke achievement anxiety depending upon individual's personal goals and values. Achievement anxiety was thus a broad concept to Yale theorists. The selection for study test anxiety as they point out, (Sarason et al 1960) is a 'near universal' experience. The most fruitful approach to the analysis should begin with the study of specific stressful situations. Test anxiety appears to be the important area of investigation.
2.5 Yerkes-Dodson Law

One of the closest approximations to a true scientific principle is Yerkes-Dodson Law (Yerkes-Dodson, 1908). It is one of experimentally based statement of relationship between drive and learning. The law holds that the relationship between fear conceptualized as drive and learning is curvilinear. A low level of drive facilitates learning slightly or not at all, presumably because the motivation it provides is inadequate to affect the performance. A high drive level interferes with the learning process so that performance is similar or worse than that obtained with low drive level. The level of drive which stimulates optimal performance lies somewhere in the middle range of drive intensity.

The law further states that the relationship between drive and performance is a function of task complexity. The optimal drive level is higher when the task is simple than it is complex: a drive level that facilitates performance on simple task may disrupt it when the task is more difficult.

Application of Yerkes-Dodson law to human learning and performance is sensible. A small amount of anxiety is insufficient to improve performance. A moderate amount energizes the individual and thereby improves performance but further increments are likely to be disruptive.

2.6 Trait-State Anxiety-Theory:

In order to study the effects of anxiety on performance it is necessary to specify the conditions under which anxiety is aroused
and then to delineate the complex effects of anxiety on performance. State-trait theorists (Spielberger, 1966) have argued that some individuals are, in general, more susceptible than others to anxiety when exposed to stressful situations. This susceptibility to anxiety is measurable by paper-and-pencil self-report questionnaires and is referred to as trait anxiety. State-trait theories assume, therefore, that those who are unusually anxious in one stressful situation will tend to manifest high anxiety in other stressful situations.

The state-trait approach draws a distinction (originally suggested by Cicero) between trait anxiety and state anxiety. The best known measuring instrument is the State-Trait Anxiety Inventory (Spielberger et al 1970) which provides self-report measures of both state and trait anxiety. The Inventory consists of two 20-item statements that ask people how they generally feel (trait anxiety) and how they feel 'right now' (state anxiety).

The basic interrelationship among the factors of trait anxiety, state anxiety, environmental stressess and performance is shown in figure 2.2.

It is assumed that the arousal of A-state involves a process or sequence of temporally ordered events. This process may be initiated by external stimuli that is appraised by an individual as dangerous or it may be aroused by situations that involve psychological stress such as threat to self-esteem that is encountered in performing on a competitive task.
Once stimulus-situation is appraised as threatening, Trait-state Theory points out that (Spielberger 1972) 1) an A-state reaction will be evoked, 2) the intensity of A-state reaction will be proportional to amount of threat the situation poses for the individual, 3) the duration of reaction will depend upon the persistence of evoking stimuli and person's previous experience in dealing with similar circumstances, 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, 5) elevations in A-state have stimulus and 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, 6) stressful situations that are encountered frequently may cause an individual to develop specific coping responses or psychological defence mechanisms which are designed to reduce or minimize A-state.

A major task for trait-state anxiety theory is to specify the characteristics of stimuli which evoke differential levels of A-state in persons who differ in A-trait.

A typical view of traits assumes that 1) traits are dispositions which predispose the person to perceive situations in particular ways and to react in consistent manner in a wide variety of situations (Spielberger 1966), 2) traits are a summary of the past states and can validly be assessed by asking the individual to describe himself as he is 'generally', 'often', 'usually' (Spielberger).
As trait anxiety is a stable individual characteristic and a primary component of most tests of anxiety, subjects with high trait anxiety show state anxiety over times in stress condition. High trait-anxiety subjects learn to defend against anxiety relatively quickly in stressful condition.

McAdoo (1989), Lushene (1970) traced theoretical development of concept of anxiety and devised six separate self-report measures of state-trait anxiety. Spielberger has brought together a wide variety of findings bearing upon a distinction that he has been emphasizing between trait anxiety and state anxiety.

2.7 Criticism of state-trait approach

Mischel's (1969) main criticism of state-trait approach is that it predicts that there will be behavioural consistency, whereas in actuality behavioural inconsistency is typically observed. However, since both trait and state anxiety are intervening variables, one must distinguish between consistency at the mediating level of states and traits, and consistency at the level of specific behaviour responses. In fact, while Mischel has concentrated his attack at the behavioural level it is likely that a certain degree of behavioural inconsistency coexists with a more obvious consistency at the mediating level. In other words, level of state anxiety can be quite well predicted on the basis of information about the stressfulness of the environment and the individual's level of trait anxiety, and thus there is some degree of consistency at the mediating level as the state-trait approach maintains. On the other hand, the exact pattern of responding
is undoubtedly influenced by an individual's level of state-anxiety, but it is obviously affected by many other factors, thus leading to apparent inconsistency of responding. The task of predicting the effects of anxiety on behaviour within the context of state-trait approach can often be achieved on the basis of 'moderator variables'. The essential notion is that the influence of any particular trait on behaviour is typically indirect, being affected or 'moderated' by a number of other traits, mediating variables and situational factors.

In short, the state-trait approach to anxiety is a valuable one; in particular, there is clear evidence that experienced or state anxiety is frequently determined jointly by environmental stress and trait anxiety.

While the whole state-trait formulation has been criticized forcefully by Mischel on the grounds that individual's do not behave with the predicted cross-situational consistency, there are reasons for claiming that Mischel has misinterpreted the data. Furthermore, Mischel has attacked a simplistic form of state-trait model that predicts a direct, one-to-one correspondence between intervening variables such as states and traits and behavioural responses. In fact, state-trait theories usually argue that moderator variables produce an indirect, but theoretically predictable, relationship between central states and observed behaviour.
2.8. Easterbrook's Hypothesis

One more influential theory emphasizing the effects of anxiety on the selectivity of attention was proposed by Easterbrook (1959). He argued that states of high emotionality, arousal and anxiety will produce restrictions in the range of cue utilization. The consequence of progressive reduction in the range of cues used as anxiety or arousal increases, 'will reduce the proportion of irrelevant cues have been excluded, however, further reduction in number of cues employed can only affect relevant cues and proficiency will fall'.

In terms of experimental data Easterbrook's notion that anxiety increases attentional selectivity has usually been investigated in paradigms incorporating both a main or primary task and used a secondary or incidental task. If anxiety reduces the range of cue-utilization, then non-anxious subjects should perform better than anxious subjects on subsidiary task. Anxiety is far more likely to have a detrimental effect rather than facilitative on performance. The relevant studies are discussed in more detail by M.W. Eysenck (1981).

Easterbrook's hypothesis is relevant to the prediction that the optimal level of the arousal varies inversely with task difficulty or complexity (Yerkes-Dodson, 1908). High-anxiety subjects perform much worse than low-anxiety subjects on difficult task, but not on easy task.

The general expectation from Easterbrook's hypothesis is that arousing agents, such as failure information, electric shock should
have comparable effects on performance. But M.W. Eysenck (1979) reports that the effects of failure and shock on performance of high and low anxiety subjects are quite different. Failure feedback impairs performance, but shock has the opposite effect. Anxious individuals often display enhanced attentional selectivity as well as distractibility. It is less clear that the process of attentional narrowing under heightened arousal as passive as Easterbrook has implied.

2.9 Task-Irrelevant Cognitive Activities

Common sense as well as much of the available evidence support the contention that highly anxious people perform most tasks less successfully than non-anxious people. In view of the evidence implicating cognitive factors in anxiety, it is perhaps not surprising that several theories (e.g. Morris et al, 1977, Wine 1971) have suggested that a major reason for the detrimental effects of anxiety on performance is the presence of task-irrelevant cognitive activities or worry associated with high anxiety. The argument was expressed in the following way by Sarason (1975: "The highly test-anxious person is one who is prone to emit self-centered interfering responses when confronted with evaluative conditions. Two response components have been emphasized by writers who espouse this view. One is emotional and autonomic-sweating, increased heart-rate etc. The other concerns cognitive events - e.g. saying to oneself while taking a test, "I am stupid ", " May be I won't pass " (p. 175).
In order to support the above hypothesis there needs to be evidence both that high anxiety does, indeed, produce an increase in task-irrelevant cognitive activities and these cognitions are responsible for the observed performance decrements.

It is perhaps reasonable to assume that anxiety-induced performance decrements will be due more to task-irrelevant thoughts or worry than to emotionality, and the relevant evidence has been reviewed by Morris et al (1977). In one study, Doctor and Altman (1969) obtained answers to worry and emotionality questions from the Test Anxiety Questionnaire in terms of students' feelings immediately prior to taking an important examination. Worry and emotionality were both negatively related to examination performance, but worry was more strongly related to poor performance. Morris-Liebert (1970) found that correlations between worry and final examination scores with emotionality partialled out, were negative and significant and correlations between emotionality scores and grades, with worry partialled out, were statistically non-significant.

Deffenbacher (1978) required high and low scores on the Test-Anxiety Scale to solve difficult anagrams under conditions of high-low stress. The worst anagram solving performance was shown by the high-anxiety subjects run under high stress and it was in this condition that self-reported anxiety was greatest.

Theories that emphasize the role played by worry seem to predict that anxiety will always reduce the quality of performance. An additional issue is that the mutual interference between task performance and task-irrelevant activities such as worry assumed by several
theorists presumably depends upon the similarity of the two-processing mechanisms, i.e. worry and related forms of verbal processing should be more impaired than those dependent upon non-verbal processing.

2.10 Recent Research

Mueller (1976) argued that there were at least two different effects that anxiety might have on learning and storage: qualitative and quantitative. Quantitatively, the effects of anxiety on learning have been investigated thoroughly with digit-span task. The evidence suggests that stress and high levels of state anxiety have a detrimental effect on digit-span, whereas trait anxiety has negligible effects.

Possible qualitative effects of anxiety on learning were investigated by Muller (1976). Anxious subjects would utilize fewer of the available attributes while using the information. The findings of the experiments indicate that high anxious subjects are less likely to use semantic features of presented material during learning but do not reveal what organizational methods they are using. There must be a variety of alternative basis of organization, such as recall in order of presentation.

Mueller (1976) argued that high anxiety subjects manifest restricted encoding of to-be remembered material, and yet the nature of the encoding process by high anxiety subjects is unknown. It is possible that high anxiety subjects are organizing the input either imaginably or conceptually in ways which the clustering measures fail to reveal.
2.11 Tobias' Model (1979)

Anxiety is an effective state since learning is a process that is essentially cognitively mediated. There are three points where anxiety can have the largest effect on learning from instructions.

(a) Pre-processing — at this stage anxiety can have impact on learning by interfering with the input stimulation which has been internally registered.

(b) During processing stage anxiety has an impact on instructions directly by affecting the cognitive operations performed to process input.

(c) Post-processing — in this stage interference in retrieving content mastered during the processing stage effects performance.

Tobias' Model is presented in Figure 2.3.

(a) The first possible effects of anxiety on instructions in prior to processing is that anxiety may reduce or restrict the effectiveness of input.

(b) The second route by which anxiety can affect instructional outcome is by working on the process, transforming the input information and generating a solution to problem.

Tobias' (1979) model calls attention to the complexity of learning process and helps to identify the important situations, tasks and individual difference variables which must be taken into account in research on anxiety and learning. A meaningful integration of insights provided by Tobias' mode, drive theory, and trait-state
anxiety theory should provide a useful framework for further research on anxiety and complex learning.

Tobias' model tells the investigator, where to look for a comprehensive theory of anxiety and learning must specify, how state-trait anxiety will influence the perception of learning materials and processing, storage and retrieval operations of the learner. Drive theory has not applied to complex processes which is central to Tobias' model but, an extension of this theory could provide useful approximation in making predictions with regard to effects of anxiety on learning process. A combinations of drive and Tobias' model would facilitate specification of the type of effects one might expect and thus focus the attention of researchers on the useful kinds of behaviour measures.

2.12 Endler's Theory

Contemporary research on anxiety has largely side-stepped the questions on measurement, accepting subject's anxiety scale-responses as factual and accurate. The Spielberger, Endler and Hunt's concepts and measures of anxiety emphasize the situation-person interactions. Argyle and Little (1972) in their review of person perception and social behaviour studies, concluded that, although situations accounted for more variance than did persons, "Person x situation interaction accounts for more variance than either by situation or person alone". Inappropriate

Endler has noted that, it is inappropriate to ask whether situations or persons are major source of behavioural variance or whether person plus situation are major source of behavioural variance.
The more sensible question in their paper (Endler-Hunt, 1966) is that, "How individual differences and situations interact in evoking behaviour?". The Endler-Hunt interaction model of anxiety provides a basis for expanding the Spielberger's state-trait anxiety theory which allows to examine the nature of person-by-situation interaction. The model is derived from S-R Inventory of Anxiousness which was developed by Endler, Hunt, Rosenstein (1962). The Inventory has included many types of situations. Endler has reported about cognitive functions which are more concerned to person related. Ekehammer, Magnusson and Eklander (1974) emphasize the interaction of the person and the situation in understanding stress and anxiety. In measuring about anxious responses and stressful situations and the work of Spielberger's state-trait anxiety, Ekehammer et al found (a) individual differences in trans-situational consistency, (b) higher and more variable anxiety among adolescent girls than boys, (c) results that questioned separateness of state-trait anxiousness, (d) additional confirmation for interactionist view-point.

Endler-Hunt (1969) found that the mode of response accounts for a large number of variance with the simple interactions between such modes, persons and situations accounting for other large portions and with smaller portion contributed by situation alone. Endler-Hunt suggest that, "Personality descriptions might be improved by emphasizing what kinds of responses individuals make with what intensity in various kinds of situations".
The state-trait and person-situation mode of response concepts do prescribe situational measurement. While completing personality questionnaires people are sometimes accurate and sometimes inaccurate. That is why measurement gets badly suffered and prediction of personality concepts gets impaired. The measurement of state-anxiety in STAI is an improvement in calling judgements of feeling in situation in which they have been just experienced. The concept of interactionism as it is defined by early theorists refers to interaction of a person with meaningful environment.