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THE EFFECTS OF FACILITATING AND
DEBILITATING ANXIETY ON MEMORY

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THE EFFECTS OF FACILITATING AND
DEBILITATING ANXIETY ON MEMORY

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THE EFFECTS OF FACILITATING AND
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CHAPTER I

INTRODUCTION

In the academic environment of today, there has been a change in the concept of anxiety. Having been a concept primarily of clinical interest and of scientific importance only within psychoanalytic theory, anxiety has emerged as a concept of theoretical significance. Individuals are confronted with various types of anxiety which may be described through the following concepts: neurotic, normal, manifest or test anxiety.

The change of the concept of anxiety from a general to a specific concept seems to have been guided by the notion that our society is achievement-oriented. This concept may be seen in the changes that currently mark our society: the diversification of services, the division of labor, bureaucratic controls, etc. These changes require young people to develop skills to a high level in order to cope with modern living and working. Great em-

phasis is placed on "successful" performance from an early age.

The test situation is nearly a universal experience in our culture with some members experiencing the threat of evaluation more often and intensely than others. In many school systems students periodically take intelligence tests, and on the basis of their scores, significant decisions are made by them. Therefore, an investigation of the effect that anxiety has on the performance of students seems relevant.

The testing process usually takes the form of having the student recall or recognize some information that he has learned previously. Memory, therefore, is an indispensable construct in the process of learning. An investigation of the relationship between memory and anxiety should make a significant contribution to the teaching profession.

The value of the study lies in the character of the educational system in which the child finds himself for twelve or more years. To the student an important aspect of school is the achievement of acceptable grades. During the test, upon which an evaluation of his learning is made, the student's performance may be effected by some emotion (i.e., anxiety).

Emotions in the lives of children have always been a concern of educators. In recent years, special interest

has been given to anxiety and its relationship to learning. The school child who experiences the pain of failure and the joy of success may or may not be influenced by anxiety. In school, anxiety is usually the central constituent of the distinguishable consequences of pain and joy, impulsive action and apathetic withdrawal, success and failure, etc. The degree to which the child achieves is an important determinant in evaluating the child's progress through school. The achievements during early development gradually accumulate through the school years when the child learns or adapts to the testing techniques used by the persons of authority. The attributes of success or failure have a bearing on the amount and kind of learning which can be expected of a child. Early, in life, the child develops habitual ways of responding emotionally to many situations.

Usually, learning experiences incorporate some form of an evaluation process. The evaluation process used in most schools is based in part upon testing. The process presents the student with a set of unique demands to which he must respond. If he is not able to, he may be classified as a slow learner, late bloomer or underachiever. Investigations into the interaction between anxiety and cognitive abilities i.e. memory, abstract thinking, etc. are rare, but many exist for anxiety and achievement i.e. GPA, final examination grades, etc. A few investigators

(Diethelm & Jones, 1947; Baron, 1962) have shown that a relation exists between memory and emotions.

Definition of Terms

A. Anxiety

The difference in the theoretical definitions of anxiety makes it difficult to compare the findings from various studies. Problems also arise from the differences in operational criteria from study to study within the same theoretical framework. The various definitions of anxiety, however, do share a common core of meaning which remains constant from study to study. There is agreement among various investigators that "... anxiety is an unpleasant feeling state clearly distinguishable from other emotional states..." (Krause, 1961, p. 461). For example, fear is an emotional state which is experienced with the perception of impending harm or evil. The perception, however, is contingent on the attributes of the individual, for not all individuals (the deeply religious, the psychopathic, the stoically brave, etc.) may perceive the situation as equally dangerous.

Anxiety is a similar emotion experienced in the absence of a threatening object. Anxiety is a feeling of apprehension without a specific stimuli in the immediate environment. (Krause, 1961).

For some students, anxiety can be a useful and a facil-

itating force which helps them overcome difficult situations. For others, anxiety only impairs their ability to perform. These types of anxiety are called facilitating anxiety and debilitating anxiety respectively by Alpert and Haber (1960).

Neurotic anxiety. Neurotic anxiety as defined by May (1950) is synonymous with clinical anxiety. Neurotic anxiety is defined as "... a reaction to threat which is (1) disproportionate to the objective danger, (2) involves repression (dissociation) and other forms of intra-psychic conflict, and, as a corollary, (3) is managed by means of various forms of retrenchment of activity and awareness, such as inhibitions, the development of symptoms, and the varied neurotic defense mechanisms" (May, 1950, p. 197). Neurotic anxiety occurs when the coping function of the organism fails due to subjective rather than objective approaches to a problem; i.e. failure not attributed to objective weakness but to inner psychological patterns and conflicts which prevent the individual from using his cognitive functions. According to Wolpe (1968, pp. 34-5), "Anxiety is the keystone of all neuroses. ... The severity of a neurosis will generally be judged in terms of amount of unadaptive anxiety."

Normal anxiety. Normal anxiety has been defined "... like any anxiety, a reaction to threats to values

the individual holds essential to his existence as a person-ality; but normal anxiety is the reaction which (1) is not disproportionate to the objective threat, (2) does not involve repression or other mechanisms of intrapsychic conflict, and, as a corollary to the second point, (3) does not require neurotic defense mechanisms for its management, but can be confronted constructively on the level of conscious awareness or can be retrieved if the objective situation is altered" (May, 1950, p. 194).

Manifest anxiety. Manifest anxiety is described by Taylor (1951, p. 90) as "... a group of widespread, directly observable overt actions (e.g. restlessness, tenseness, excessive perspiration, etc.) ... Further these symptoms are assumed to be accompanied or paralleled by internal emotional responses (primarily controlled by the autonomic nervous system)."

Test anxiety. S. B. Sarason et al. (1960) has identified test anxiety as being that anxiety measured by questions containing an element of painful consequences related to school and test-like situations.

B. Memory

Memory is a cognitive function and as such is a learned capability for responding. Adams (1967, p. 9) has defined memory as "... the habit states of a subject that give the capability for correct occurrences of a cri-

terion response."

Piaget, according to Furth (1969, p. 152) says "... that the specific function of memory in the strict sense consists of the evocation of a particular past. This evocation is specifically related to the accomodative activity of knowing focused on the figural aspect of a particular event and temporally located at a certain point in time."

According to James (1890) memory is the knowledge of a former state of mind after it has already dropped from consciousness. When memory functions to recall data in the "antecedent" part of the present time it is termed "primary memory". Events that are still in consciousness represent primary memory.

"Secondary memory" or "memory proper" is defined as the recollection of objects from the "recent" past which have been absent from consciousness altogether and are now brought back again. The objects are brought back from a reservoir in which the objects have become lost among a milieu of other objects (James, 1890). Secondary memory, then, constitutes those events that are able to be recalled but which had not been conscious at the time of the recall test.

Both primary memory and secondary memory are components of short term memory (STM). Short term memory with respect to long term memory (LTM), is considered to be only

a few minutes occupying the time between original learning and retention. The studies pertaining to long term memory utilize retention periods or intervals anywhere from minutes to a day or a week.

Some investigators study the memory process through a retention test (Jenkins & Postman, 1949) while others (Averbach, 1963; Fitts & Posner, 1969) study retention as it reveals something about the memory states which have survived over the interval and which underlie the fundamental capabilities to respond. The latter process utilized various means of measuring memory. Although various methods of measuring memory exist, and will be reviewed in the next section, they will not be elaborated upon because they are not relevant to this study. They will be mentioned only in terms of the functional relationship that exists between the measures. The two methods used in the present study are recall and recognition. Recall and recognition have been distinguished as two ways in which retention may be observed objectively (Adams, 1967).

Retention. Retention is the stability of learned material over a period of time.

Forgetting. Forgetting is the converse of retention (Adams, 1967).

Recall. Adams (1967) defines recall as having the subject remember an item in its original form.

Jung (1968, p. 103) states that "The method of recall requires the subject to reproduce as much of the original material as he can without the aid of any external cues."

Recall according to Hollingworth (1913, p. 533) "... is that aspect of memory process in which a 'setting', background of association-cluster, is present in clear consciousness, but a desired 'focal point' is missing." The "focal element" is the essence of the material to be remembered.

Unaided recall is the reproducing of previously learned material without cues from the original material being given to the subject.

Aided recall is the reproduction of material by a student given the same cue as on the original learning. The student is then asked to make the correct response.

Recognition. Recognition according to Adams (1967, p. 10) "... requires a recognition test of retention in which the subject is asked to identify the criterion events from among alternative, new events." The responses are not attempts to repeat earlier responses but to identify the earlier responses.

Jung (1968, p. 103) states that "On a recognition test, the correct item is presented with one or more alternatives which serve as distractors, on the assumption that if the item is remembered it can be identified from among several alternatives."

Hollingworth (1913, p. 533) defines recognition as having the "focal element" present "... in the form of sensation, image, or feeling and the question is whether or not this element will recall a more or less definite general setting or background."

Tiffin and McCormick (1965, p. 586) writing in the field of consumer psychology state that recognition, as used in consumer research, "... is measured by presenting subjects with advertisements, magazine articles, or other relevant material, and asking them if they can identify the material as having been seen (or 'noted') previously. Recall ... is measured by asking people to reconstruct their impressions, or to give information about articles, advertisements, or whatever other material is being tested. ... the method places a heavy burden upon memory of the content of the material."

The clarification of the effects of anxiety on cognitive abilities has significant educational implications. Knowledge of how anxiety affects memory can help in developing the intellectual growth of the slow learner, underachiever, etc. A knowledge of the interaction between anxiety and memory could also lead to the development of more effective teaching methods.

Statement of the Problem

Previous studies on anxiety were based upon several theoretical approaches. Studies have been made of the lower performance of some "anxious" students and the conditions under which the lower performance was observed. Some of the studies have shown that girls consistently score higher than boys on general and test anxiety scales.

Many previous studies employed personal threat as an independent variable. In contrast with the previous studies, the present study utilized a non-threatening situation similar to that used by I. G. Sarason (1956). An investigation of the effects anxiety has on memory in a non-threatening situation is significant because memory is significant in the measurement of achievement.

In order to investigate the influence of anxiety on memory in a non-threatening situation, the following question was explored: Is there a difference between the scores of male and female students on The Achievement Anxiety Test (AAT) and on a test of recognition?

Hypotheses

The following hypotheses were tested:

Hypothesis 1. Female students enrolled in Education 120 have better retention of courses they have taken than male students have.

$$1. a \bar{X}_f < \bar{X}_m$$

H₀1. There is no statistically significant difference between the mean scores on the memory questionnaire of male and female Education 120 students in their retention of courses they have taken.

$$H_0 1. a \bar{X}_f = \bar{X}_m$$

Hypothesis 2. Education 120 students who are classified as facilitators have better retention of courses they have taken than students who are classified as debilitators.

$$2. a \bar{X}_{fa} < \bar{X}_{de}$$

H₀2. There is no statistically significant difference between the mean memory scores of facilitating and debilitating Education 120 students in their retention of courses they have taken.

$$H_0 2. a \bar{X}_{fa} = \bar{X}_{de}$$

Hypothesis 3. There is a significant interaction between variables anxiety and sex.

$$3. \bar{X}_{as} \neq 0$$

H₀3. There is no statistically significant interaction between variables anxiety and sex and between sex and anxiety.

$$H_0 3. a \bar{X}_{as} = 0$$

CHAPTER II

REVIEW OF THE LITERATURE

Anxiety

The review of the literature shows that a number of concepts of anxiety exist. The concept of anxiety to be used in this study has been derived from two basic constructs: the Behavioral or Motivational Construct and the Hypothetical Construct.

Behavioral Construct

As a behavioral construct, anxiety may be thought of as either a group of response tendencies or an energizing drive.

Response tendencies. Anxiety denotes a group of responses or response tendencies which may be instrumental in removing the individual from a threatening situation. Other response tendencies, according to Hull (1943) and Mowrer (1939), are "stimulus-producing" sensory effects serving as danger signals to trigger off association tendencies or habits, or as Freud (1936b) put it, defenses. The danger signaled by anxiety, according to psychoanalytic

theory, is a psychic danger derived from the intensification of a particular drive. Although anxiety, as a group of responses, has been identified, it will not be pursued because it is not pertinent to the present study.

Energizing drive. Within the concept, anxiety usually refers to a unitary, discriminable drive or drive-related state. It differs from the response tendency concept in that it is conceived as a generalized energizer of behavior—a drive which combines indiscriminately and multiplicatively with all habits present.

Proponents of the energizing drive theory (Spence, 1958; Taylor, 1956) were influenced by Hull, but there are some important divergences and elaborations. In Hull's theory certain constructs, H(habit), D(drive), and E(excitatory potential) mediate between the stimulus and response in any learning theory in a multiplicative manner. Spence, however, introduces an additional theoretical construct r_e , "a persisting emotional response" (Spence, 1958, p. 132). Students with high levels r_e show a higher level of drive and, therefore, perform more effectively in simple learning situations than students with low r_e (Spence, 1958). Spence's and Taylor's theories are simple because they deal with only one response in a learning situation. One response is considered a "simple task" in that the correct response initially ranks high in the habit hierarchy. The individual either responds to the conditioned stimulus with a reflexive

response or he does not. Spence indicated, therefore, that a high level of anxiety should, by energizing the person to behave, facilitate learning. His theory "... holds that anxiety will energize or strengthen each of the habits in the hierarchy in proportion to the initial strength of habit" (Levitt, 1967, p. 113). Learning will proceed more slowly if the task is complex. In a complex task there are a number of competing response tendencies, all of which are equally weak in habit strength. The role of anxiety as an energizer is to increase the habit strength of the many incorrect response tendencies at the expense of the only correct answer. Spence, to date, has not proposed a method to predict the effect of anxiety in a learning situation involving more than one habit.

Taylor (1951) investigated the effect that anxiety as a drive would have on the development of a conditional defense response. Sixty subjects were used in the experiment - thirty from the high end (anxious) of the distribution of the Manifest Anxiety Scale and thirty from the low (non-anxious) end. Candles were used as the conditioned stimulus and a puff of air administered to the right eye was the unconditioned stimulus. Taylor, using differential instruction as the source of drive to heighten anxiety, concluded that instruction has little or no effect upon the sub-groups formed from groups of anxious and non-anxious students. The anxious groups were, however, consistently superior in con-

ditioned eyelid response throughout the course. Spence and Taylor (1951) studied the conditioning experiment. The results verified Taylor's conclusion in that the high anxious groups were consistently superior in eyelid conditioning.

The degree to which anxiety, aptitude, and GPA are related has been discussed in terms of characteristics of the anxiety instrument used, characteristics of the student, and properties of the criteria. Several investigators have contributed to knowledge concerning the negative relationship between anxiety and aptitude. Studies have been performed in an attempt to describe the relation between habit interference and motivation as measured by a scale of "manifest anxiety". In performing the studies, however, an important methodological problem arose. The problem centered around the fact that subjects who were designated by the scale as differing in anxiety also differed in intellectual ability. A study by Grice (1955) pointed to this very problem. In order to determine if aptitude was a factor in explaining the differences obtained from the Manifest Anxiety Scale (MAS), the Discrimination-Reaction-Time Test was administered to a group of airmen basic trainees. The low anxious group showed a general superiority and greater superiority in problems of greater difficulty. These subjects were then administered the Air Force Clerical Aptitude Index which showed that an intellectual difference did exist between the two groups. The results were in favor of the low-anxious

group. A negative correlation was substantiated. Similar studies were made by Nicholson (1958), Montague (1953), and Longenecker (1962), with similar results.

In a similar study, Kerrick (1955) administered the MAS and a group of Air Force Tests (AFQT, Arithmetic Reasoning, Word Knowledge, and Mechanical Aptitude) to 128 Air Force Trainees. These results also showed that a negative correlation existed between anxiety and aptitude.

Farber and Spence (1953), using a ten-choice stylus maze which involved competing responses, investigated the performance of anxious and non-anxious students. Students were selected on the basis of their scores on the Test Anxiety Scale (TAS). The results indicated that anxious and non-anxious students differed in performance due to drive level. Drive level was considered a function of the specific characteristic of a given task. A test was performed by the investigators on whether or not the results could be explained by the students' general learning ability. The results of the test did not support such an explanation of differences between the students.

Matarazzo et al. (1954) reported that human maze learning had a significant curvilinear relationship to increasing levels of anxiety when total time to learn the maze was the criterion. When the number of trials was the criterion a significant rectilinear relationship was found. Matarazzo et al. pointed out that when time was the measure

of learning the middle anxiety range was superior to either the low or high anxious students. In the trial measure the middle and low anxious students were superior to the high anxious students.

In order to determine whether or not the differences in anxiety level were responsible for the differences found in the mean learning abilities or whether they could be attributed to differences in intellectual ability, the 1949 edition of the American Council on Education (ACE) Psychological Examination for College Freshmen was administered and the students' Grade Point Average (GPA) for the previous year were acquired. The investigators found that GPA had no significant relationship to level of anxiety. An apparent curvilinear relationship was found between the ACE and increasing levels of anxiety when time was the criterion. The results indicated a slight but significant negative relationship.

Castaneda et al. (1956, p. 328) were "... concerned with the performance of fifth grade children on a complex learning task as a function of the relative difficulty of the various components comprising the task and of their scores on a scale of manifest anxiety adapted for children from Taylor's adult form."

The thirty-seven subjects participating in the experiment were divided into a high anxious category and a low anxious category. The high anxious group consisted of nine

boys and twelve girls and the low anxious group consisted of six boys and ten girls. Results indicated that significant interaction existed between anxiety and task difficulty. The high anxious students had a tendency to be inferior on difficult components of a task but superior on the less difficult components of the task than low anxious students. Other studies in the area were performed by Munz and Smouse (1968), Lanzetta et al. (1956), and Janis and Feshback (1953), which showed similar results: item arrangements facilitate different degrees of arousal.

McCandless and Castaneda (1956) reported the correlations they found between anxiety, academic achievement and intelligence. Instruments used were the Children's Form of the Manifest Anxiety Scale (CMAS), the Iowa Every Pupil Test (IEPT) and the Otis Quick Scoring Mental Ability Test, Form B. Subjects used were children from fourth, fifth, and sixth grade public school. "For the population of 55 sixth grade boys so tested, the Pearsonian r between the Otis and the CMAS was $-.16$, nonsignificant; for the 45 sixth grade girls, this r was $-.43$, significant at less than the $.01$ level. Partial r 's were computed for the composite score on the IEPT and anxiety, with intelligence held constant. This computation revealed a partial r of $-.28$ for boys, significant at less than the $.05$ level; and of $-.45$ for girls, significant at less than the $.01$ level" (McCandless & Castaneda, 1956, pp. 380-1).

Results also showed that thirteen of thirty computed relationships between school achievement and anxiety were significant. The fifth grade population and fourth grade boys showed no consistent pattern of relationship. For the fourth grade girls, relationship ran from moderate to high. The groups in which a relationship existed had a tendency for the more complicated skills (i.e. reading, arithmetic, etc.) to suffer more interference from anxiety than the simpler skills such as spelling. Girls tended to be more inhibited than the boys. A significant negative relationship was found between anxiety and intelligence for sixth grade girls but not for the boys.

Morgan, Sulton-Smith and Rosenberg's (1960) study was based upon the results obtained by McCandless and Castaneda. McCandless and Castaneda had suggested that the relation between anxiety and achievement may change from grade level to grade level. In order to clarify the changes, a more precise differentiation of the tested population into achievement levels was performed.

The CMAS was administered to 366 fifth and sixth grade children. The children's combined scores earned on the California Achievement Test and the Durrell-Sullivan Reading Achievement Test, taken at the end of the fourth and fifth year respectively, were used to differentiate among the subjects by achievement levels.

The results indicate that caution should be used in

obtaining anxiety indices at one grade and using them to form high and low anxiety groups several years later.

Dauids' (1955) study investigated the results of intercorrelating the different measures from the Taylor Anxiety Scale, Psycho-somatic Inventory, and Anxiety Self-rating from students whose motivation was experimentally manipulated. Two groups of students were selected on the basis of being "job seekers" or "helpers of science". Each of the groups was administered the anxiety measures. The "job seekers" were selected because of their high motivation to secure a job supposedly open as a highly paid assistant to staff members doing research. The "helpers of science" were told that the results would not affect them personally in any way. Dauids found that within the two groups, significant intercorrelations existed among the three different measures of anxiety. The "helpers of science" achieved scores indicative of manifest anxiety and maladjustment to a greater extent than the "job seekers". Dauids concluded that the Taylor Scale measured essentially the same variable measured by other instruments. The Taylor Scale may be more susceptible to deception than other scales.

McKeachie, et al. (1955) suggested that if students were permitted to comment about difficult or ambiguous items on a test they might gain better insight into the problem. Using the regular classroom examination in a general psychology class the investigators encouraged students to comment about

test items on their answer sheets. The results showed that those individuals who used the spaces to comment made significantly higher scores on the test than those who did not or were not allowed to make comments. One of the functions of giving students an opportunity to comment on test questions was to reduce the detrimental effects of anxiety. The rationale was "... that if students could 'blow off steam' about items that cause them difficulty, performance on succeeding items would be improved. Permitting students to write comments about difficult or ambiguous items might act to discharge feelings or to give the student more closure on the item" (McKeachie, et al., 1955, p. 93).

Calvin, McGuigon and Sullivan (1957) followed up McKeachie's et al. (1955) study in order to test their "anxiety reduction" hypothesis. Subjects were 152 undergraduate female students from Hollins College who were enrolled in two introductory psychology classes, two introductory Spanish classes and a Spanish literature class. The students were given the A-Scale with the biographical inventory as described by Taylor (1953) in order to distinguish between the high and low anxious students. The Otis Higher Examination of Mental Abilities was also administered. The classes were divided at random into an experimental and a control group. The experimental group was allowed to make comments about items on the test. The control group was not allowed to make any comments about items on the test. The results showed that when the

five classes were combined, the experimental group performed significantly better than the control group. In the experimental group High Anxious (HA) subjects were significantly worse on the first half of the examination than the Low Anxious (LA); but were not significantly different from the LA subjects on the second half. In terms of gain from the first half of the examination to the second, the HA subjects in the experimental group were significantly superior to the LA subjects in the same group. The HA subjects in the control group made more errors than the LA subjects on both the first and second half of the test. The HA subjects improved on the test but the LA subjects improved more.

I. G. Sarason (1961a) investigated the relationship between test anxiety and general anxiety by using the TAS and a short version of the MAS. In addition, the Lack of Protection Scale (LP), a measure of separation anxiety, which seems to be less specific than the TAS and less general than the MAS was correlated with the other two. 152 students in an introductory psychology class were administered the personality scales. Results indicated no significant difference between the sexes although the correlation was higher for female than male. The three anxiety scales are positively intercorrelated to a moderate degree especially for male students. When the scores for the females and males on the TAS, MAS and LP scales were grouped and a correlation performed between the scores on the scales for each

sex, the correlation of scores for the females were higher than for the males.

A study by Russell (1963) investigated the influence of affectivity of verbal materials upon acquisition and retention. More precisely, the problem is: (1) How the properties of the task influence acquisition and retention; (2) How the properties of the learner influence acquisition and retention." (Russell, 1963, p. 36). Subjects used were students enrolled in an introductory course in psychology at Boston University. The high and low anxious students were differentiated by means of scores from the Taylor Manifest Anxiety Scale. The high group had 36 subjects (23 men and 13 women). The low group had 36 subjects (21 men and 15 women). The subjects were individually tested and individually presented with the words on the Semantic Differential. The words to be learned were obtained from "An Atlas of Semantic Profiles for 360 Words" (Jenkins, Russell, and Suci, 1959). A list of fifteen words from the "good" and fifteen from the "bad" portion of the good-bad scale were used. A Lafayette memory drum was used to present the words to the students. The method of retained numbers was used for testing. The method is a form of recall in which the length of the material to be learned surpasses the memory span. The number of presentations is not sufficient for complete learning. Retention was measured by the number of items the subject reproduced. Results showed that high anx-

ious groups learned and recalled "bad" words better than they did "good" words. They also learned and recalled "bad" words better than "indifferent" words. In contrast, the low anxious groups learned and recalled "good" words better than they did "bad" words. The trend held for "good" words and "indifferent" words. The study tended to point out that properties of a task i.e. the affective characteristics, influence acquisition and retention.

Rapaport (1950) has quoted Prescott who, in referring to the role of emotions in memory-functioning, said "The important point, perhaps, is that a continuum of affective experience exists, varying from vague feelings of pleasantness or unpleasantness up to profound experiences which greatly disturb both mental and physical functions. At various critical points in this continuum adaptive modifications of the body economy occur, varying according to the functional demands of the situation. It is essential to distinguish the level of affective experience involved when discussing the reaction phenomena characteristic of the state or when considering the influence of the affect upon learning, upon the higher mental processes, or upon behavior" (p. 35).

Hypothetical Construct

As a hypothetical construct, the definition of anxiety is that anxiety "... is an entity or process that actually

exists (but is not at present fully observable) and which gives rise to measurable phenomena, including phenomena other than the observables that lead to hypothesizing the construct" (Ruebush, 1963, p. 462). Such a construct allows anxiety to be used as a process or state variable.

Process variable. As a process variable, anxiety refers to "... an actual, but presently unobservable, inferred activity or process that is conceived to have properties and/or effects other than those leading to its being inferred, and the arousal of which depends upon the presence of an experimental condition which has at least consensual validity as being generally threatening for most children" (Ruebush, 1963, pp. 463-4). Thus, the arousal of anxiety in a situation is inferred from the presence of some physiological response such as galvanic skin response. The inference here is that anxiety will effect a person's performance in a systematic manner. Anxiety as a process variable is assumed to be a transitory phenomenon which can be equally manipulated in all subjects regardless of prior state.

Carter, Jones, and Shock (1934) not only investigated the relationship between learning, affective and galvanic factors but also how this could be measured more accurately and under what conditions the obtained results would be more meaningful. The basis for the study was predicated upon the evidence accumulated at the time which denied that a relationship existed between learning, affective and galvanic

factors.

Subjects were 102 sixth and seventh grade children from California. The number of children of each sex was the same. The children met on two afternoons and two mornings a week later and were asked to perform certain tasks which included: (1) experimental selection of test materials; "(the classification of words into 'pleasant', 'indifferent', or 'unpleasant'); (2) evaluation of the materials as emotional stimuli; (3) an association experiment, with measurement of galvanic responses; (4) a learning experiment, with immediate and delayed recall." A portion of the results showed that "... there are, on the average, definite relationships between emotional factors and ease of learning, when suitable stimulus materials are used" (Carter, Jones, & Shock, 1934, p. 204).

State variable. A state variable is assumed to be an enduring condition that is hypothesized to have resulted from and is defined by a past interaction of the person and his environment.

a. Chronic emotional state: Some investigators have used anxiety as a chronic emotional state variable. As such, anxiety is considered to be with the person at all times. A chronic emotional state may develop from more or less omnipresent properties of the environment, i.e. spatiality, light, light and shade contrasts, etc. Most of the properties, if not all, enter into the subject's experience. If any of them

becomes connected to anxiety responses the subject will be persistently, and apparently causelessly, anxious.

Diethelm and Jones (1947), basing their study on the work performed by Franz in 1919, investigated the effects of anxiety in psychiatric examinations; more specifically "... to gain an understanding of the influence of anxiety on psychologic functions" (Diethelm & Jones, 1947, p. 334). The individuals studied in this investigation exhibited anxiety of pathologic intensity. The investigators pointed out that memory is affected by various emotional influences. Intense emotions seem to affect attention and concentration and, to a lesser degree, understanding and recall. The conclusions indicate that anxiety seems to decrease active attention as measured by the longest digit span verbalized without an error. Passive attention, as measured by recall, was affected adversely by intense anxiety. Learning was shown to be reliably slower when anxiety was present. Retention, tested by repetition of a maze test, was affected unfavorably by anxiety.

b. Predispositional state variable: Other investigators have viewed anxiety as a predispositional state variable. The person is not considered to be equally anxious in all situations. He is predisposed to become anxious in certain situations specified by the theory. Within the framework of the theory, Sarason thinks that anxiety will be aroused in some people if, and only if, they are exposed

to a situation with evaluative components (S. B. Sarason, et al., 1960).

In opposition to Spence's and Taylor's views of anxiety - a general energizing drive - Mandler and S. B. Sarason (1952) and S. B. Sarason, et al. (1960) conceived anxiety to be a strong learned drive which is situationally evoked. One person may find a situation stressful although he is not anxious in other situations. Another point in the theory is that an individual through past experiences has learned characteristic responses to anxiety which he brings with him to the current situation. Such reactions were termed task-irrelevant. Task-relevant responses are those tending to facilitate performance. The investigators believed that the study of anxiety should be an examination in depth of particularly stressful situations. Thus they narrowed their concept of anxiety to a particular area. In limiting anxiety, test anxiety was selected as the frame of reference. On this basis, the Test Anxiety Scale (TAS) was developed (S. B. Sarason, et al., 1958c). The TAS is also called the TAQ by other investigators (Mandler & Cowen, 1958; Grooms & Endler, 1960; Levitt, 1967).

A study by Mandler and Cowen (1958) described the scoring, reliability, norms and sex differences of the Test Anxiety Questionnaire developed by Mandler and S. B. Sarason. The norms and sex differences for college students were achieved by administering the questionnaire to a group

(179) of sophomores and juniors at Harvard, Radcliffe and Boston University. The high school population was 286 sophomores in Massachusetts. Significant sex differences occurred only at Boston University. Sex differences in the high school sample were in the same direction but non-significant. The relation between the TAQ and intelligence (Hemmon-Nelson Test of Mental Ability) showed negative correlation significant at the .05 level. Similar correlations were found by Cowen in high school. The TAQ correlated with the Otis Gamma significantly and negatively at the .02 level.

Grooms and Endler (1960) performed a similar experiment. It was a partial replication of the Mandler-S. B. Sarason (1952) study in which they found some socio-economic correlates of anxiety associated with academic achievement. One of the purposes of the experiment "... was to study the interrelationships between anxiety, aptitude, and achievement using simple linear product-moment correlational procedures" (Grooms & Endler, 1960, p. 300).

Subjects were 91 male students enrolled in an introductory psychology course at the Pennsylvania State University. The subjects were administered the Test Anxiety Questionnaire (TAQ). The subjects were trichotomized according to their scores into high, medium, and low anxious categories. High and low anxious subjects were designated as HA S and LA S respectively. The subjects also took the

Pennsylvania State University Academic Aptitude Examination. The results indicate the following conclusions:

1. HA S_s do not differ significantly from LA S_s on the aptitude or achievement measure used in the study.
2. There is a significant negative correlation between test anxiety scores and the measure of aptitude.
3. There is no direct, significant relationship between test anxiety and academic achievement (Grooms & Endler, 1960, p. 303).

A variation of the Mandler-Sarason approach is presented by Alpert and Haber. Alpert and Haber reasoned that the TAQ identifies, in its extreme scores, those individuals who are debilitatingly affected by anxiety and those who are unaffected. The investigators believed that according to Mandler and Sarason's theory there should be some individuals whose performance is facilitated by test-taking anxiety. Alpert and Haber used this theory to compose two independent inventories - the facilitating anxiety scale and the debilitating anxiety scale. The amalgamation of these two scales led to the construction of the Achievement Anxiety Test (AAT) (Alpert & Haber, 1960). The items used on the AAT were chosen specifically for their ability to predict grade point averages in college students. Empirically stated the characteristic defined by the AAT is related to academic performance (Levitt, 1967). The characteristic inherent in the AAT is "... that it distinguishes between anxiety that is reported by the respondents as debilitating and anxiety reported as facilitating test performance" (Dember, et al., 1962,

p. 427). Performance criteria that have been found to be significantly related to the AAT have been SCAT, midterm tests (MTT) and GPA (grade point average). The AAT+ scale used as a predictor variable in conjunction with the SCAT showed correlations of .51 and .71 between MTT and GPA respectively and .52 and .63 between MTT and GPA respectively for the AAT-.

Another measure of anxiety was developed by Cattell' (1964). Administering a 500 item questionnaire to "normal" and "pathological" groups in a consulting room atmosphere, Cattell found a first order factor among the items on the questionnaire. The process revealed seven smaller factors of anxiety from the "400 experimentally measured alleged manifestations of anxiety" used on the test (Cattell, 1964, p. 396). Among these seven factors existed a second order factor which "... is identical with the single factor in the behavioral and physiological measures" (Cattell, 1964, p. 397). Cattell theorized that the seven factors were specialized expressions of a common anxiety originating from a single pool of anxiety symptoms. The results from his Objective Analytic Battery and questionnaire showed that the nature of anxiety was "... a lack of confidence, a sense of guilt and worthlessness, an unwillingness to venture a dependence, readiness to become fatigued, irritable, and discouraged, uncertainty about one's self, suspicion of others, and a general tenseness" (Cattell, 1964, p. 398).

According to Cattell, the single dimension anxiety factor is one on which a normal person could score quite high temporarily for purely situational reasons. This coincides with Mandler and Sarason's conception of anxiety in that it is a strong learned drive which is situationally evoked. Pathological individuals (neurotics) on the other hand, could show some indifference to anxiety provoking realities. Having distinguished anxiety from general motivational level stress, and neuroticism he states that anxiety can be measured as a pure factor. Such a separation may bring to light a new dimension which will enable us to isolate various other concepts (i.e. non anxiety personality variables that interact with anxiety and which may have a detrimental effect on students such as those mentioned above).

Mandler and S. B. Sarason (1952) investigated the "... role of drive states in a testing situation; more specifically, the extent to which anxiety responses are evoked by the situation and the relation of such responses to performance and learning" (Mandler & S. B. Sarason, 1952, p. 166). Several other studies (Child, 1954; Feshback & Loeb, 1959; Nicholson, 1958) have reported data consistent with the response-interference view. Mandler and Sarason's view differs from that of Alpert and Haber in that Mandler and Sarason have only one scale which is unidimensional. Anxiety responses are either debilitating or not.

Based on earlier work, S. B. Sarason, Mandler, and

Craighill (1952) stated the following hypothesis: "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 (S. B. Sarason, Mandler, & Craighill, 1952, p. 561).

The latter part of the above statement seems to compound the alternatives of a facilitating effect of anxiety and no effect of anxiety on academic performance. An assumption which seems to have been made is that for an individual who is not affected by anxiety he would be described as one whose debilitating effect is exactly counteracted by his facilitating effect. This implies, then, that the facilitating effects of anxiety can be measured.

Mandler and S. B. Sarason (1952) indicate also that intelligence tests may or may not describe adequately the underlying abilities of students who have high anxiety drive during the testing situation. Furthermore, the authors state that "... the influence of familiarity with test material and its effect upon differences between the two anxiety groups appears to be an important variable in interpreting test results" (Mandler & S. B. Sarason, 1952, p. 173).

According to Banghart (1959) there are factors involved

other than anxiety in situations where anxiety is a significant influence. Anxiety is not the sole determining factor but becomes a significant influence under circumstances i.e. groups. The study investigated the effect of anxiety on students when they were arranged in groups. One group consisted of students who were encouraged to work together, while in the other group, working together was prohibited. The groups were called cooperative and non-cooperative respectively.

Subjects were twenty-four university students who were given the TAS. The subjects were then assigned to either the cooperative group or the non-cooperative experimental group. The former had free exchange of ideas and information and the latter had no deliberate communication between the members. The apparatus used consisted of colored lights, predetermined and automatically controlled, arranged on a panel. The subjects were to predict which light would come on next. Correlations were calculated between problem-solving time and anxiety and between problem-solving efficiency and anxiety. Anxiety had a minimal influence on problem-solving time for the "easy" problem for both cooperative and non-cooperative groups. For "hard" problems anxiety had a more pronounced influence on the cooperative group than the non-cooperative group.

Davidson and S. B. Sarason (1961, p. 199) used observations as a technique in order "... (a) to determine the

relation of anxiety about school to a wide variety of personality and behavior variables measured in the classroom and (b) to explore the effects of differences in classroom atmosphere upon those relations".

Subjects used were 96 second grade pupils of whom 77 had been given the Test Anxiety Scales for Children (TASC) and the Defensiveness Scale for Children (DSC) questionnaire at the end of the first grade. The assessment of the student's personality and classroom behavior was accomplished by a check list of 25 variables over a ten point scale which was given to the observers and teachers who rated all 96 children.

An analysis was made between the observer's and teacher's check list rating to determine the degree of inter-observer and teacher-observer agreement. Also, the observer's classroom notes were compared with the teachers' methods of responding to children's needs and the teachers' expression of emotions and value judgments.

The results indicate that the teacher is a prime variable when studying the needs and personality characteristics in relation to TASC and DSC scores of students. Different patterns of results can also be expected between sexes. The main difference was that test anxiety scores served as predictors of boys' but not girls' school behavior and characteristics. The pattern was reversed for the defensiveness

scores. The conclusions lead to the speculation "...that feeling and admitting to anxiety is an ego-alien and disturbing state of affairs for boys, but may be ego-syntonic, not disturbing, and perhaps helpful in a motivational sense for girls" (Davidson & S. B. Sarason, 1961, p. 209).

Kaye, Kirschner, and Mandler (1953) investigated the effect test anxiety had on memory span in a group test situation. Thirty-six students, seventeen low anxious and nineteen high anxious, were given a memory span test consisting of number series, mixed letters, and short words. Immediately after an item was read to the students they were required to write down as much of the item as they were able to recall. The results showed that a significant difference existed between the high and low anxious groups. The low anxious group had a significantly higher score on the memory span test than did the high anxious group.

S. B. Sarason, Davidson, Lighthall, Waite & Ruebush (1960) have shown negative correlation between anxiety and I.Q. and achievement. McCandless and Castaneda (1956) showed that anxiety was related to I.Q. in sixth grade girls but not boys. I. G. Sarason (1960) has pointed out numerous studies that conflict in their conclusions about the relationship between anxiety and intellectual performance for certain student populations. Sarason states that the situational and motivational variables associated with testing have not been systematically manipulated in studies attempting to relate anx-

xiety and intelligence.

I. G. Sarason (1956) did, however, investigate the effects of anxiety and motivational instructions on serial learning. The study was concerned with anxiety, as measured by the Taylor Anxiety Scale, and two instructional variables, high and low motivating instructions and failure and non-failure reports, on performance in a serial learning situation.

Subjects were 180 students (99 males and 81 females) enrolled in introductory psychology classes at Indiana University. The subjects were divided into twelve groups that represented all combinations of levels of anxiety, high and low motivating instructions and failure and non-failure conditions.

The stress conditions imposed upon students in the high motivating instructions were to tell the students that they were to learn a list of nonsense syllables, the results of which would be a measure of intelligence and ability to think in abstract terms. In addition, they were told that each syllable missed lowered their score when it was compared with other students of their own age. In the low motivating instructions the students were given a list of words and the emphasis was placed upon remembering the list characteristics rather than on the subjects' performance. Following the above instructions, the students in each group were randomly assigned to one of two conditions: 1) failure condition - students were

told they had failed the test and 2) non-failure condition - equal time was spent with these students in neutral conversation. The students in each of the conditions were given one more trial with the list of words supposed to measure intelligence.

Results showed that an interaction existed between anxiety and differential motivating instructions. High motivational instructions were debilitating for high-anxious groups and facilitating for low anxious groups. The subjects who were told of their failure performed significantly poorer than the students who were not told of their failure. However, this effect dissipated in time. Further studies were done by I. G. Sarason (1957a, 1957b) on the effects of anxiety and experimental stress on verbal learning. The results indicated that under pre-experimental neutral conditions significant differences were not found in performance between groups that differed in anxiety.

I. G. Sarason (1959) studied the relationship between intelligence and personality measures for male and female freshman and sophomore college students. Thirteen intellectual measures (seven aptitude and six high school GPA) and four personality variables, three of which were measures of general anxiety, were correlated. Of the personality scales used, only test anxiety related negatively and significantly to intellectual performance as measured by TAS for both male and female students. Support was thus given

to the hypothesis that the more specific the measure of anxiety is to a situation the more consistent will anxiety relate to performance.

Feldhusen and Klausmeir (1962) treat anxiety "... as a generalized and diffuse fear response to many aspects of the environment" (p. 404). The anxious person perceives real or fantasized phenomena as threatening to the self whereas the non-anxious person does not perceive the phenomena as such.

A study by Feldhusen and Klausmeir (1962, p. 403) was performed to ascertain to what degree affective characteristics of the student interact with his cognitive abilities. More specifically, "... the relation between anxiety as measured by a test and I.Q. and between anxiety and school achievement in children of low, average, and high I.Q."

The investigators administered the Wechsler Intelligence Scale for Children to 120 students, 80 average and high I.Q. and 40 low I.Q. Children who were mongoloid, cretin, etc., orthopedically handicapped or handicapped in hearing, vision, or speech, and those suffering from epilepsy were excluded from the study.

The results substantiated the findings of negative relationship between anxiety and cognitive abilities calculated by Sarason et al. (1960) and McCandless and Castaneda (1956). The study also revealed that "... (a) a significant negative correlation between anxiety and I.Q. in both boys and girls whereas McCandless and Castaneda found it only in girls;

(b) significantly higher mean anxiety scores for girls than boys; (c) the same pattern and about the same size of correlation of anxiety with I.Q. and three achievement measures for both sexes; and (d) significantly higher mean anxiety scores for low I.Q. children than for the average and high I.Q. with the difference between the latter two groups not being significant" (Feldhusen & Klausmeir, 1962, p. 407).

Pervin (1967) investigated the moderating effects of anxiety and aptitude in relation to academic performance and the moderating effects of aptitude on the relationship between anxiety and performance. He separated 717 freshmen students into groups who were either debilitated or facilitated by anxiety. An intercorrelation of anxiety, SAT-V, SAT-M, CSG (cumulative school grade) and GPA was performed. The results support previous findings that a significant relationship ($r=.20$) exists between each scale of the AAT and SAT performance.

Facilitating and debilitating anxiety were used as moderator between aptitude and performance. The results suggested that aptitude best predicts performance for the low debilitating anxiety group. Ability did not seem to moderate the relationship between anxiety and performance. However, a study by Heath (1956) showed that high cognitive ability is partially resistant to the adverse effects of threat on performance. Heath's study indicates that

anxiety may vary in relation to the strength of other antecedent variables present.

More recently Cox and Leaper (1959), using the children's form of Sarason's test (TAS) and General Anxiety Scales (GAS) on Australian children, confirmed the investigations by S. B. Sarason, et al. (1958b) on the difference between sexes. Scores on both scales were similar to those found with American children. On the GAS, girls consistently obtained higher scores than boys. The authors seemed to think the higher scores for girls were due to item selection - certain items seem to be biased toward known anxiety reactions of girls. Cox and Leaper's final conclusion was that the scales (TAS and GAS) can be applied for the purpose for which they were originally designed. Jensen (1958) also substantiated the fact that girls score higher on the TAS and GAS than boys.

Many studies (Mandler & Sarason, 1952; Kerrick, 1955) have been concerned with the more global properties of anxiety tests, i.e. reliability, correlation, etc. and the relationship they have with intellectual variables and personality measures. Other studies (Taylor, 1951; Grice, 1953) have reported the effects of experimental conditions and the relationship they had on anxiety and achievement. Few studies have tried to combine the two methods. A study that purports to study the combination of the methods was done by Levy et al. (1969).

Levy, Gooch and Kellmer-Pringle (1969) studied the effects of repeated administration of the Sarason Scales (GA and TA) in relation to differences in school administration, ability, sex and testing. The progressive school was defined as having mainly a child-centered system. The traditional school referred to one in which the principal emphasized educational factors as adult-directed education, academic competition, achievement by ability, class teaching, and progress testing.

Subjects were 181 boys and girls in two schools who had completed the Sarason test on three occasions. The children were taken in groups of 20 to 35. The slower children were put in groups of a half-dozen or less.

Results showed that girls scored higher than boys; scores tended to fall with repeated use of tests, and a different pattern of mean scores was evident across testing occasions within each school. The investigators indicated "... that GA is more influenced by the broad difference in school regime, but that TA is affected by more specific situational factors such as streaming within the schools and events surrounding the testing occasion" (Levy, et al., 1969, p. 171).

The study by Levy et al. (1969) tends to point out what other investigators, working with tests like the Taylor Scale, have ignored: people are not necessarily anxious at all times but may become so in specific situations i.e. testing. If,

as stated previously, anxiety may be considered a drive variable which is germane to academic performance, different functional relationships between performance, achievement and anxiety may result from different classroom or school administrations as pointed out in the Levy et al. study. The study showed the failure of TA scores to fall after repeated testing in different schools which tended to substantiate the findings of Banghart (1959) and Heath (1967); factors may exist which maintain anxiety over periods of time. The present study has two important characteristics in common with the above study. Both are studying, in "naturally occurring" academic events, the possible effects of personality measures on intellectual variables. The difference between the two studies lies in the concept of "naturally occurring" events. The study by Levy et al. (1969) was concerned with the relationship between anxiety, as measured by GA and TA, and achievement that may result from different classroom or school disciplines regarding intellectual ability and academic performance. The present study is concerned with the effects that anxiety, as measured by the AAT, may have on cognitive abilities, more specifically, memory in a non-stress academic situation. Although no stress was incorporated within the study either through the instructions or through the manipulation of experimental variables, Levy et al. (1969) indicated that certain factors that may maintain anxiety could have been oper-

ating at the time. The factors that may be significant in maintaining anxiety are that of stress conditions inherent in competition (Pervin, 1967) and the approach of examinations. Certain examinations may arouse anxiety that was previously unexperienced by the student. Another factor that may moderate the variables anxiety and performance in classroom situations is that of the personality characteristics of the examiner (I. G. Sarason, 1960). Literature in the area of personality characteristics of the examiner on the anxiety level of subjects is sparse. Neither of the above factors were controlled in the present study or in Levy's et al. study and should be taken into account in further studies.

In a recent study by Cox (1964) he investigated whether or not a relationship existed between achievement and test anxiety and the performance for children in arithmetic and reading. The subjects used in this study were 262 children attending fourth and fifth grades in Canberra, Australia. The children were divided into "superior" and "inferior" subgrades based upon their academic records in the first three grades. The children were given the Test Anxiety Scale (TAS), the Index of Achievement Behavior (IAB) and the Australian Council for Educational Research Junior B Intelligence Test. Results showed that a highly significant negative correlation exists between the TAS and the arithmetic examination marks. An explanation of this result, offered by Cox (1964, p. 914) was "... in terms of the evo-

cation of response tendencies which seem likely to impair attention and concentration in the classroom situation. A high level of test anxiety in elementary children is assumed to be associated with both a high level of drive and with the evocation of specific response tendencies."

Alpert and Haber's (1960) study investigated the paper-and-pencil instruments used in research for the measurement of individual differences in anxiety as it effects academic achievement performance. The problems considered in the study were:

1. The relationship between scales which are designed to measure general anxiety and scales specifically designed to measure test anxiety (specific anxiety scales), and a comparison of the relative efficacy of the general and specific scales as predictors of academic achievement performance.

2. The relationship between the construct of anxiety and that of aptitude and the methodological problems involved in separating these two operationally.

3. The direction of the effect of anxiety upon academic achievement performance. (Alpert & Haber, 1960, p. 207).

Statement 3 above refers to the direction in which the Anxiety Achievement Test (AAT) correlated with various measures of academic performance (GPA, course grade, final examination grade, mid-term examination grade, etc.).

Through the use of the AAT, Alpert and Haber concluded that specific anxiety scales and general anxiety scales measured something different. General anxiety scales did not predict academic performance as well as specific anxiety scales. Specific anxiety scales, more often than the general

anxiety scale, can account for variance in academic performance other than that accounted for by a measure of aptitude.

Schmeidler, Ginsberg, Bruel, and Lukomnik (1965) confirmed the findings of Alpert and Haber, that of a significant correlation between debilitating and facilitating anxiety. The sample consisted of 174 college students of whom 32 subjects were tested. The subjects were given questions from the Edwards Personal Preference Schedule which contributed to scores on need for achievement (n ach). High achievement needs "... were operationally defined as scores in the upper quartile of the group; low achievement needs ... were operationally defined as scores in or near the lowest quartile of the group" (Schmeidler, et al., 1965, p. 248). Schmeidler et al. found that high n ach students tended to solve complex verbal learning problems more efficiently if their drive strength was high. Low n ach students tended to solve the problems more efficiently if their drive strength was low.

Bush (1954) studied the effect of anxiety on performance. The area of performance which he investigated was that of memory as measured by verbal recall.

Two hundred subjects were selected from an elementary psychology class and were given the Welsh Anxiety Scale of the Minnesota Multiphasic Personality Inventory. The Welsh Scale utilized a statistic - AI - which was proposed as an index of anxiety and a concept of internalization termed

internalization ratio - IR. Welsh (1952) presents evidence that the two measures may be used in quantifying judgments of anxiety. Evidence suggesting anxiety in subjects was obtained from inspection of the MMPI (Minnesota Multiphasic Personality Inventory). The statistic AI is comprised of the combined scores of H_s , P_t , D and H_y on the MMPI. The IR scale is obtained by dividing H_s , D, and P_t (feeling scales) by H_y , P_d , and M_a (character disorder scales). "Anxiety ... is that contribution attributed to patients complaining of subjective feelings such as tension, nervousness, apprehension, fear, etc., which is generally accompanied by somatic concomitants - vertigo, dyspnea, pre-cordial pain, gastric distress, headache, and the like" (Welsh, 1952, p. 66). In Bush's (1954) study, those students (19) who scored within one standard deviation of the mean were classified as non-anxious. The anxious group (15) were those students who scored at least one standard deviation above the mean. The procedure used with the memory material was three sets of pictures representing different types of ego threat. Ten pictures were in each set. The pictures, in sequence as to their anxiety provoking ability, included symbolic objects and scenes, maternal rejection and animals manifesting aggression. During the first recall period each picture was presented for three seconds. The subject was then asked to tell the examiner the pictures he had remembered. Two days later a second recall took place. Seven

to ten days later a third recall took place. The criterion for anxiety was the incidence of perceptual distortion by the student.

Results indicated that as the level of anxiety was raised recall would decrease. The hypothesis was rejected which stated that variability of recall would decrease as induced anxiety increased. The effects of anxiety on performance apparently dissipated with time.

An investigation conducted by Mayer (1959) was concerned with the function of memory under different stressor conditions. Mayer was concerned with two types of stressors presented at two different periods in the interval between learning and recall. The types included those stressors designed to arouse strong and not so strong feelings of negative emotions. The periods within which these stressors were utilized was during the interval between the presentation of the material and recall and during the recall. Also of interest was the nature of the changes that occurred in memory as a function of the stressors.

Subjects used were both graduate and undergraduate students at Clark University. Fifty subjects were randomly assigned into five groups: ten in a control group and ten each in four experimental groups. Each group consisted of an equal number of males and females. Instruments used were: (1) A Felt Anxiety Measure, (2) A Confidence in Memory Measure, and (3) A Memory Questionnaire for the stressor material. The

Felt Anxiety Measure was developed by Mayer to measure how upset subjects reported feeling during recall. The measure was used to indicate whether or not felt anxiety as reported by the subject related to the stressor condition. The memory task was presented in the form of two spoken passages made up and recorded by the experimenter. The passages contained 130 words divided into fifty memory units.

Results showed that "... stressors presented during recall produced a greater frequency of less mature cognitive behaviors than stressors presented during the interval, (b) emotion-arousal stressor produced a greater frequency of less mature cognitive behaviors than non-emotion-arousing stressors, supporting the experimental predictions, (c) the greatest frequency of less mature cognitive behaviors was found in the recall emotion-arousing group which had emotion-arousal coupled with external interference, and (d) as predicted, emotional-arousal during the interval carried over into the recall and the interval emotion-arousal group produced a greater frequency of less mature cognitive behaviors than the interval non-emotion-arousal group" (Mayer, 1959, p. 92).

Baron (1962, p. 146) investigated the relationship between "(a) memory and feelings of pleasantness and unpleasantness, and (b) memory and degree of intensity of emotion." Using a thirty item word list and four general science classes in a high school, she concluded that correlation existed between memory and pleasantness and unpleasantness of feeling. There was, however, a positive correlation between memory and intensity of feelings. Whether or not the positive correlation was significant was not indicated in the study.

Memory

The process of learning involves rote learning (associationistic learning) and the application of certain past experiences to present situations (cognitive learning). The type of learning that is observed may be either type. This is dependent upon the past learning of the individual learner. Jung (1968, p. 12) states, "When a learner uses mnemonic devices or other such memory aids in a situation considered rote in nature, he is actually displaying cognitive learning; because of particular past experience, he is able to see some relationship between the task to be learned and some past learning of his own."

The nature of the student is inferred from the nature of the task from which the conclusions are being drawn and to the nature of the student's past associations. A student possesses and may utilize a vast repertoire of learning techniques and acquired associations or knowledge. How he uses these depends on the nature of the task. Failing to recognize this, educators and researchers in education could be misled into generalizing the conclusions obtained from one type of learning situation to all learning tasks.

A particular learning task of the student represents a mold which limits the learner to specific processes whereas other tasks may require different processes, e.g. the process of learning for mathematics, science, etc. is usually different from the process used by a student in the social sciences.

This results in conclusions about the nature of learning to be limited to the particular task involved. The advantage of using standard tasks in learning is that it permits the accumulation of facts regarding learning in those specific situations. These facts, however, may not apply to other tasks. Consequently, investigators seek to devise and study other tasks in order to test the generalizability of findings with standard or traditional tasks. Grimes and Allinsmith (1961) indicate that the student's perception through reconstruction of stimuli may be different from reality as a consequence of his particular needs, ambitions, or anxieties. With such considerations it seems likely that teachers cannot teach a lesson in such a way that all students will perceive the content as intended or will attend to it as hoped, free of crippling anxiety. Working with methods of instruction in reading, the investigators concluded that high anxious students are debilitated in unstructured teaching situations. Anxiety has no or very little effect under structured teaching conditions.

Changes in Memory Performance

During the process of learning, changes in performance are considered to be relatively permanent (Adams, 1967; Gagné, 1965; Jung, 1968; Mednick, 1964). Experience tells us, however, that learned material is not perfectly retained.

Forgetting occurs as indicated by measuring retention some time after the original learning has taken place. The loss in retention becomes greater as the interval after learning becomes greater. Memory's persistence over a period of time is measured by a retention test of some kind. A common belief by many people, laymen as well as professional people in psychology and education, is that a change in memory is revealed whenever retention is less than perfect. Something is assumed to have occurred to the memory state over the retention interval. Some intervening variables could have had an effect on memory, but nothing may have happened because a retention loss is not the same as a memory loss. A memory loss could and most likely is the result of some physical or psychological contusion of the organism's mental function. A retention loss may be attributable to a host of variables such as a reduction in motivation, the presence of fatigue, insufficient stimulus cues which might have been operative to arouse the memory state to its full expression or a host of emotional factors which might have lowered performance at the retention test. Another aspect of retention loss is that of forgetting. The study of forgetting may be said to be "... a search for variables and their functions that influence change in memory over the retention interval and cause a decrement in correct responding, and for the inferences that these relationships allow for mechanisms of memory and forgetting" (Adams, 1967, p. 10).

Memory and Performance

In the past three or four decades the concept of "memory" has undergone the greatest metamorphosis since Plato and Aristotle. Many of the findings during this time are directly related to an understanding of human capacities in skilled tasks. Skilled performance in the complex forms as well as in the simplest forms requires some temporary storage of information. However, memory experiments, in trying to isolate and measure functions such as forgetting, retention and recalling, have demonstrated how memory can function under given laboratory conditions, i.e. stress, distractions, etc., and not how it does function in the everyday life of a student, i.e. school, work, etc.

In a paper by Rapaport (1943) memory is traced through the theoretical concepts of such investigators as Ebbinghaus, Zeigarnik, Lewin, Freud, Korsakow and some Gestalt psychologists. Rapaport concludes his article with the premise that a new theory of memory will have to embrace the problems of memory functioning in everyday thought processes. The author enumerates certain criteria that should be a basis for the new theory. He states that "drives, strivings, motives, needs, affects, emotions, tension systems, determining tendencies, attitudes, mental sets, etc., are named for the different dynamic factors responsible for the organization of memories. The organization may result in the facilitation or

inhibition of reproduction or may result in transformation, distortion, symbolical substitution, condensation, or displacement of memories. A theory that purports to explain the memory phenomena of everyday life as an aspect of thought processes can only be built on the basis of investigations that reveal the relation of these dynamic factors to the phenomena of memory organization" (Rapaport, 1943, p. 242).

Nonsense syllables. Experiments and investigations on memory were given their initial impetus during the latter part of the nineteenth century due to the work of Ebbinghaus (1885) and James (1890). Ebbinghaus published his book On Memory in 1885. This book became the pioneer experimental study in the whole field of learning, retention, and remembering.

In order to simplify and standardize his experiments, Ebbinghaus introduced nonsense syllables. This device was used in order to provide a large quantity of material of fairly uniform difficulty. A difficulty that was encountered when working with nonsense syllables was that of inequalities. To compensate for this, Ebbinghaus learned many lists of these nonsense syllables.

Greater precision in removing inequalities in nonsense syllables was introduced by Muller and Schumann (Woodworth & Scholsberg, 1965). Using alliteration, assonance, or rhyming of neighboring syllables they found that these nonsense syllables could form a familiar word or a part thereof

and so learning of these syllables would be facilitated. The experimentors also used a memory drum in their memory experiments. A drum was rotated behind a screen and exposed one syllable at a time through a little window in the screen. This apparatus has been improved by Haggard and Gerbrands (1947).

Learning tasks which are classified as rote learning situations purposely utilize nonsense syllables or relatively unrelated words with which the students have had a minimum of familiarity. The material to be learned is presented on a memory drum for short, timed exposures to the students. The reason for the short exposure time is that the short duration does not allow some learners to get practice by rehearsing during the presentation of each item. The learner is restricted in relating his past learning to the present learning. The method requires the subject to form the new association or whatever task he is required to do with a minimum of aid from both his past techniques or strategies of learning and his previous knowledge and associations.

Short and related words. Another portion of research which has been done on memory besides nonsense syllables is that of short words or related words. The short words are usually two or more lists of adjectives composed of similar items. When the two lists are composed of similar items, there will be a combination of effects which, according to Osgood (1949), results in a retroactive inhibition. Retro-

active inhibition increases with the degree of intertask similarity according to McGeoch and McDonald (1931). When two lists of adjectives for study are presented to subjects, one of which is to be recalled and the other list is to be recognized at some later time, there is less retroactive inhibition than when both tasks call for recall or both for recognition (Jenkins & Postman, 1949). Postman's (1952) experiment concluded that recall is more sensitive to retroactive inhibition than is recognition.

Another aspect of learning tasks is to have the learning material involve lists of related words. Each of the words in the list belongs to a limited number of categories. Bousfield (1953) used such a method in which the task of the student was to recall as many of the words presented as he could, in any order. The student, here, is able to apply his past learning i.e. to think. Since the student knows that the words in the list belong to one of four classes or categories, he might restrict his recall within these categories. The recalling of an item in a category might help in searching for other items from the same category. The process of recall utilized by the learner might reflect the fact that some of the words in the list are related. This is usually indicated by the sequences or clusters of words from a given category that tend to be recalled together. Using the related word method in studying an aspect of learning permits the application of certain past learning to the present task.

The performance, therefore, is cognitive.

Attention span. Some investigators studying the span of attention have required subjects to report the number of dots present in a 100 millisecond visual flash (Fitts & Posner, 1969). Characteristic findings are that attention span (dots reported with 50% accuracy) is about eight (Woodworth, 1938).

Averbach (1963) has indicated that attention span is not fixed but depends upon the exposure time. The threshold of accuracy increases at the rate of one item every ten milliseconds until a total of eight items is reached. A plateau of eight items suggests that the subject experiences increasing difficulty in keeping track of which items have already been counted, indicating that the limitation in the span of attention is a function of the limits of memory.

Glanville and Dallenbach (1920) investigated the relationship between the number of objects and the amount of information they asked subjects to report about each object. Subjects used were two psychology majors and the author, Dallenbach. Patterns of dots were shown to subjects who were then asked for the number of dots; letters, and asked for their names; geometrical figures, and asked for the names of the figures; and figures, which were to be identified by both form and color. Glanville and Dallenbach found that the average number of objects reported with complete accuracy was as follows: dots, 8.8; letters, 6.9; geometrical forms, 3.8;

figures identified by form and color, 3.0. The results showed that the more information that was called for, the fewer the number of objects that were reported correctly. The subjects of the study indicated that their performance had depended largely upon memory.

Memory and performance: recall and recognition. Various methods of measuring retention have been posited by investigators. Woodworth and Scholsberg (1965, pp. 695-6) stated, "... that there are four stages or phases involved in memory: impression, retention, recall (or reproduction) and recognition." The investigators, along with Postman and Rau (1957) state, however, that these stages are somewhat artificial and are convenient names or labels for successive parts of an experiment on memory. Postman, Jenkins and Postman (1948) also state that various ways of measuring retention exist: recognition, reconstruction, relearning and recall. Neither of these gives us a better or a more complete picture of memory than the others. Practice by the student prepares him differently for the various tests by which his achievements can be measured.

An experiment in memory may be broken up into three periods: learning period, retaining period, and the testing period. We can usually see what is happening during the learning period at various points in time, (e.g. the studying of certain material). Similarly, during the testing period we can see what the student does when he is asked to repeat

material. The retaining period which fills the gap between learning and testing is an area that is less amenable to experimental control than are the learning and testing periods. There have been various methods designed to study the process of retention: memory span (Averbach, 1963; Fitts & Posner, 1969; Glanville & Dallenbach, 1920; Jacobs, 1887; Woodworth, 1938), method of retained numbers (Binet-Henri, 1894; Bolton, 1892; Lyon, 1917; Raffel, 1934; Smith, 1896), the prompting and anticipation method (Ebbinghaus, 1902; Robinson & Brown, 1926), serial learning versus paired associates (Calkins, 1894, 1896; Thorndike, 1908), recognition method (Achilles, 1920; Smith, 1905), reconstruction method (Gamble, 1909; Luh, 1922) and recall (James, 1890; Murdock, 1960; Postman & Phillips, 1961). Some of these methods are concerned with all of the above stages or periods while others pertain to that method of measuring memory pertinent to the particular investigation being conducted.

A study by Gomulicki (1956) cites two investigators (Bartlett, 1932; Katona, 1940) who have dichotomized their definitions of recall. The dichotomy is based upon the aspect of recall they emphasized. There is, however, a common denominator which permeates the dichotomies. The Atomistic types are those students who concentrate on the separate parts of the recall material. The Holistic types are the students who view the situation as a whole, interpret it, and recall the parts by virtue of their real or supposed

relation to the whole.

Gomulicki (1956) has dichotomized recall into "condensers" and "changers". A minute but basic difference exists between the common denominator type and Gomulicki's dichotomy. The "condensers", while reproducing all the really important parts of the data, omit many details indicating that they cannot be as atomistic as Bartlett and Katona claim for their types. The "changers" alter the original data in synonymous expressions or rearrangements which will leave the meaning unaltered. When the varying reproductions of the original data are ignored, the precipitance or the translation into synonymous expressions, regarded as interpretive, is extremely small.

The amount of retention has been shown by various investigators (Jenkins & Postman, 1949; Postman & Jenkins, 1948; Postman, Jenkins, & Postman, 1948) to depend upon the method of measurement. There is no one true measure of memory (Postman, Jenkins, & Postman, 1948; Woodworth & Scholberg, 1965). Perceptual effects of previous learning depends upon the conditions under which performance is tested. "The general concept of 'memory' or 'retention' is an inference from the similarity of the functional relationships revealed by the different methods of measurement" (Postman & Rau, 1957, p. 217).

Postman and Jenkins (1948) investigated the effects upon student's performance of retention tests which were either ex-

pected by the student or they were other than the one expected by the student. A list of twenty-five two syllable adjectives was given to a group of subjects. The list was read five times. Three tests were given to these students: anticipation, free recall, and recognition. Learning instructions were appropriate to the respective test procedures.

The test results showed that instructions do not make a significant difference in retention scores. The results are in accordance with Taylor's (1951) study. The various tests, however, contribute greatly to differences in student's scores. The highest degree of retention was through recognition. Anticipation had the least with free recall being somewhere in between recognition and anticipation. The interaction effect between learning instructions and testing procedures indicate that retention varies significantly with the relationship between instruction and testing procedure. The results also indicate: "To the extent that learning instructions single out and emphasize those aspects of the learning tasks which are to be used in the retention test, S's preference is favored. To the extent that learning instruction and retention problems fail to harmonize in their selective emphasis on certain aspects of the learning task, performance is impaired" (Postman & Jenkins, 1948, p. 688).

A student's readiness for a particular type of reten-

tion test affects his learning behavior. There should be a correspondence between learning instruction and retention test as a condition basic to optimal performance. The above study (Postman & Jenkins, 1948) showed that non-correspondence between test and instructions significantly impairs retention performance.

Some investigators (Nagge, 1935; Postman & Postman, 1948; Whitely, 1927) have shown that retroactive inhibition will be reduced if original learning and interpolated learning take place under different sets. Sets have been identified by Gibson (1941) as being concepts which imply a state of preparedness, a readiness of a student to respond selectively to a circumscribed range of stimuli material. A variety of sets have been postulated such as mental set, motor set, unconscious set, preparatory set, task set, etc.

A study by Jenkins and Postman (1949) varied the set by employing different testing procedures for the original and interpolated learning activities. Subjects used in this study were men and women (total of 48) enrolled in an experimental psychology class. A list of twenty-five items was read to the students five times. At this time the subjects were tested either by recalling each successive item or by recognition whereby the subjects were given a list of 100 alphabetized words which included the above twenty-five items. Subjects were asked to check the items they recognized. The interpolated tasks followed the testing of the original learning.

Results indicate that "change in set helps in the functional isolation of materials learned successively. Any condition which decreases the interrelation between two learnings contributes to their functional isolation from each other, so that the responses appropriate to one task do not intrude upon those relevant to the other" (Jenkins & Postman, 1949, pp. 71-2).

The position of a universal concept of retention as applied randomly to measures of retention rests largely upon the similarities between the various measurement techniques. Also, the concept seems to rely upon certain relationships that exist between the various measures of retention.

The measures of retention "... have been used to gauge three main effects of practice: (a) the differentiation of the learning series from other members of the same population of verbal items (nonsense syllables, words, etc.). The degree of differentiation is measured directly by tests of recognition. (b) The availability of the individual items for active reproduction without support from reexposure to the original learning materials. Availability for reproduction is measured by free recall ..." (Postman & Rau, 1957, p. 217.)

Recognition and recall apparently focus on different facets of the changes produced by practice. Thus, in order for a general theory of memory to evolve, it is essential to analyze the relationship between these measures. Research, however, in the comparison of these different measures of retention has been sparse. There is a fact, nevertheless, for which there is substantial experimental evidence: tests of recognition yield higher scores than do

tests of recall (Achilles, 1920; Andrew & Bird, 1938; Clarke, 1934; Hollingworth, 1913; Korn & Jahnke, 1962; Luh, 1922; MacDougall, 1904; McNulty, 1965; Myers, 1914; Postman, Jenkins, & Postman, 1948; Postman, Adams, & Phillips, 1955; Postman & Rau, 1957; Stalnaker, 1935).

An exception to these findings was a study done by Anastasi (1932) in which she found no difference between "logical memory" as measured by recall and recognition.

A factor that distinguishes recognition and recall is response learning or integration. Response learning is necessary for recall in order for an item to be retained. It is not necessary, however, on a recognition test since the correct item is always provided. In order for an item to be recalled the whole item must be available as an integrated response for the subject, but at a lower degree of learning or retention, it need only be recognized. For recognition, discrimination is required because of the placement of correct items among incorrect alternatives.

Korn and Jahnke's (1962, p. 382) investigation of recall and recognition as measures of immediate memory showed that "... the recognition measure produced higher scores, extending further the generality of the conclusion that higher retention scores are associated with recognition than recall." Subjects used were twenty-one men and twenty-seven women undergraduates. Four classes of material were used in order to measure immediate memory of recall and recognition. The classes were:

digits, nine consonants, and nine each of high association syllables and low association syllables. They further concluded that regardless of the response measure, "... retention was a function of the class of material to be retained" (Korn & Jahnke, 1962, p. 382).

Myers' (1914) study consisted of three testing situations given at different times to different groups of students. The students consisted of 333 boys and 355 girls ranging from the fourth grade to high school. The students were given six, ten, and twenty words as stimuli which they were made to believe was a spelling test. At some later date, ranging from two minutes to three months, the students were asked to recall or recognize these words. For recall the students were asked to repeat the words a short time after the words were given to them or several months thereafter. For recognition the investigator placed the stimulus words among the same number of other words and the students were asked to check the words they recognized. From the study the investigator derived the following conclusions:

1. The recognition efficiency is about two and one half times that of recall, and this ratio varies slightly with different amounts of stimuli and with different intervals of time.

2. Great individual difference obtains for both recognition and recall, but for recognition it was proportionally higher than for recall, and differences of time intervals and length of stimuli-list affect the variability of recall more than that of recognition.

3. The correlation between recall and recognition is surprisingly low; many who recall only one or two words or even none have a remarkably high record for recognition.

4. There is a general increase of incorrect answers and a decrease of correct answers with an increase of time-interval.

5. For long intervals of time more of the answers for recognition are correct than those for recall and this superiority of recognition answers increases with increase of time interval.

6. Many of the incorrect words given show a high degree of association in form or in meaning with the stimuli-words; general ideas are carried over most frequently.

7. The comparative order of frequency for each word, in recognition and recall, is about the same for the first words of the stimuli-list, but there is a wide variation for those least frequently recalled.

8. A knowledge of the number of words to be recognized seems to be a great aid in recognition.

9. The affective element is very much more pronounced in recognition than in recall.

10. Some sex differences are obvious:

(a) The girls are superior to the boys for both recognition and recall, and much more for recall than for recognition. Their superiority for recall invariably holds true even when divided into grades, while for recognition this superiority obtains only for large groups.

(b) A higher correlation between recall and recognition obtains for girls than for boys.

(c) For recall the girls seem to be more variable than boys while for recognition the opposite holds true.

(d) The girls recall more incorrect words than the boys, while the boys recognize more incorrect words than the girls.

(e) Both for recall and recognition, a higher percentage of the total answers given by the girls than those given by the boys are correct (Myers, 1914, p.456).

Two classical experiments often used to portray the fact of the superiority of recognition over recall were done by Luh (1922) and Postman and Rau (1957). Luh (1922) did a systematic study comparing the retention curves yielded by different measures of retention. Materials used were lists of twelve nonsense syllables of low association value. Five

measures of retention were used: recognition, anticipation, reconstruction, written reproduction (recall) and relearning (savings).

By the anticipation method, the subjects learned the lists to a criterion of one perfect repetition. After lapses of time of twenty minutes, one hour, four hours, one day, and two days, retention was measured by one of the five above mentioned measures.

The test of recognition used a series of twenty-four syllables in which the twelve correct items were interspersed. In the reconstruction test, the subjects were required to arrange the original twelve syllables in the correct order. For written reproduction the subjects were given five minutes to write down the items of the learning series. The anticipation method was given on the first trial of relearning. The final measure of retention was calculated by taking the percentage of trials saved in relearning the list to the original criterion of one perfect repetition.

Luh's results show agreement with the classical results of Ebbinghaus. All the curves show a negative acceleration although considerable variations in slope do occur. The different measures of retention keep the same rank order throughout all time intervals except for relearning, which after four hours, intersects written reproduction and reconstruction. The highest scores were yielded by recognition. Recognition was followed by reconstruction, written reproduc-

tion, and anticipation. The relearning curve drops more slowly than the other curves. The divergence of the curve of relearning proved to be of specific interest. The method was used in the early studies of the classical curve of forgetting.

The forgetting curve of Ebbinghaus was described by a logarithmic equation. The general form of which has been applied to the curves yielded by other methods of measurements, such as recognition, written reproduction, and reconstruction (Bean, 1912; Strong, 1913). The object was to try and formulate a general equation to which all curves of retention could be fitted. According to Luh, however, "... relearning and the other processes do not satisfy the same type of logarithmic equation ..." (Luh, 1922, p. 28). Also, "... There can be as many curves of forgetting as there are situations and methods of measurements ..." (Luh, 1922, p. 42).

Luh's experiment does suffer from major methodological flaws and limitations. Some of these are as follows:

(1) The retention tests were given in sequence to the same subjects. There is a strong chance that one method influenced another.

(2) The retention curves are based upon the same ten subjects. Each of these subjects were represented more than once at each point on the curve. Some served as many as five times. This flaw persisted in learning experiments until re-

cent years. Now a proper design for experiments on verbal retention should use independent groups of subjects.

Postman and Rau (1957), due to the criticism of Luh's study, repeated Luh's study under appropriately controlled conditions. The study was performed in order to obtain further information on the relationship among measures of retention with materials varying in degree of meaningfulness. Luh used nothing but nonsense syllables of low association value. Postman and Rau used a twelve item series of nonsense syllables widely varying in association value along with a twelve item series of English words of different degrees of meaningfulness. Three measures of retention were used - recognition, free recall, and relearning. The relearning method yielded two scores: "... amount of recall on the first trial of relearning (test of anticipation) and percentage of saving in relearning to criterion" (Postman & Rau, 1957, p. 230). Subjects used were 180 college students who were assigned to the experimental conditions in rotation. The purpose of the experiment was not disclosed to them.

Results showed that recognition yielded the highest scores, anticipation yielded the lowest scores, and free recall occupied the hiatus between the two. The percentages obtained from the savings method fell just below those for free recall. As pointed out by the investigators, however, "... savings scores are not strictly commensurate with the other measures since saving is a complex function of both

recall and subsequent relearning" (Postman & Rau, 1957, p. 266).

In accordance with Luh's study, the curves of retention showed negative acceleration. The shape of the curves, however, did deviate from the "classical" curve of forgetting:

(a) recognition shows no retention loss at all over the two day period; (b) the free recall of words decline steadily and shows little evidence of negative acceleration; (c) all other curves show either no loss or some degree of improvement between twenty-four and forty-eight hours. Earlier failures to find such delayed rises in retention are ascribed to the uncontrolled effects of proactive interference (Postman & Rau, 1957, p. 266).

Also, their results did not indicate that meaningful materials were retained better than nonsense materials.

D. B. Lucas (1960) critiques the "Study of Different Techniques of Measuring the Readership and Rememberance of Printed Advertisement" which was conducted by the Advertising Research Foundation (ARF) and executed by the Committee on Printed Advertising Rating Methods (PARM). The PARM survey replicated the field method of two leading commercial research companies working on printed advertising: Daniel Starch and Staff and Gallup and Robinson, Inc.

Two rating methods were used: an interview and a classification into prospective or non-prospective consumers. Since both methods depend upon memory of the respondent, an effort was made to study variables that may influence memory performance (i.e. "Estimates were obtained of the time elapsed

between the interview and the last reading of the issue, and the time elapsed since first reading; publication data was also related to interview data") (D. B. Lucas, 1960, p. 11).

Two methods were used in obtaining memory scores: aided recall and recognition, the latter used by Starch and the former by Gallup and Robinson. Results indicate,

... that the recognition method is not measuring simple memory, perhaps one is justified in saying it is more likely a measure of noting or behavior. It is not really a measure, since there is no control whatever on the answer given. Yet, whatever is being rated or measured is amazingly steady - largely independent of time, independent of audience characteristics in many ways, ... and even independent of interviewer skill except for the following of certain basic rules (D. B. Lucas, 1960, p. 19).

Aided recall does behave like a measure of memory - more precisely a measure of recall or memorability. Respondents cannot use deceptive methods of raising their scores. Results showed that recall declined over a period of days. Recognition, however, was maintained over a period of several weeks. Recognition scores are less affected than recall scores by sampling differences. Genuine recognition usually requires a fuller perception of an item than may be assured by mere exposure to the item. Recognition is not a controlled response and may very often be irresponsible since anyone can claim to have seen anything. Inaccurate claims can be a result from genuine confusion with similar impressions of previous items in a series. The absence of control of recognition claims makes it

difficult to estimate the degree of error caused by genuine confusion and the part resulting from motivation and other factors.

The study by McNulty (1965) is not only another good example that shows the superior retention of recognition over recall but the results also show the variance of recognition given a variety of alternatives. McNulty maintains that for correct recognition, partial learning is often sufficient. However, when the alternatives approach similarity, recognition becomes more difficult and a higher level of learning is needed for the correct answer to be selected from the alternatives supplied.

Using materials which differed in the extent to which partial learning would exist after original training, McNulty used words of different structure to that found in the English language. In other words, he designated words which were unlike real words as first order approximations and those words which closely approximated English words as third order approximations. The highest order of approximation were the real words.

McNulty theorized that if partial learning aids in recognition then the superiority of recognition over recall would be greatest for the most difficult material. Items which were partially learned could not be recalled but could be identified on a recognition test, especially when the alternatives were dissimilar. Recognition, however, would have

little if any superiority over recall when using easy materials since recall scores would not be limited by failure to learn each item completely as a unit. Recognition would also have less an advantage with similar alternatives because partial learning is not sufficient to identify the correct alternative.

McNulty's results showed that recognition had superiority over recall but the degree of superiority is a function of the similarity of the alternatives to the correct items; and also to the correct items as well as the difficulty of the items as categorized by degree of approximation to English. Recognition is high when alternatives are low in similarity to the correct items. It is lower when this similarity is high. The largest discrepancy occurred with the materials that had the lowest degree of approximation to English.

McNulty's study substantiated the results of Davis, Sutherland, and Judd (1961). These authors investigated the recognition of fifteen numbers or letters which were shown to their subjects embedded in a larger list of thirty, sixty, or ninety items of the same type. The investigators also included recall of the fifteen. When the students were asked to recall the items, they received correctly forty-one percent for letters and forty-five percent for numbers. In the recognition test, however, when the alternatives were ninety, percent correct fell to fifty for letters and forty for number. These values are not much different from those

for recall.

Since in recognition tests the correct item is usually mixed with alternatives which serve as distractors the assumption is that the item will be remembered if it can be identified from the alternatives. If the item has been forgotten, however, it cannot be identified correctly except by chance. For this reason, recognition scores are usually adjusted for guessing. The correction for guessing is often an underestimate since it assumes that all alternatives are equally likely to be selected by someone who has forgotten the material. A student, however, can usually rule out some of the alternatives as being wrong which restricts his guesses to the remaining alternatives. This process gives a better chance of selecting the correct item.

The methodological problem mentioned above points out the fact that it is difficult to compare amount of retention under different methods. As illustrated in past studies, estimates of retention are higher under recognition than recall. But the quantity of retention under recognition depends on the assumptions one makes about the guessing factor and the number of alternatives from which one has to select the correct item.

Postman, Jenkins, and Postman (1948) have shown in their study that all alternatives are not equally likely guesses. The study gives a comparison of the methods of active recall and recognition in the measurement of reten-

tion for verbal materials. The major purpose of the study "... was to compare and contrast recognition and active recall performance with materials and amount of practice held constant and order of tests balanced" (Postman, Jenkins, & Postman, 1948, pp. 511-2).

Two experimental groups learned the same material under identical conditions of practice. Although both were tested by recognition and recall the order of the tests were different. One group was tested by recognition and then active recall and the other was reversed. The material used was a list of forty-eight nonsense syllables with a twenty-five percent associative value between the syllables. The student was asked to write down all the syllables he could remember or he was given a multiple choice test and asked to underline the syllables which he recognized as having been read previously. The items in the multiple choice test had four alternatives. Some of these alternatives differed from the original nonsense syllables by only a letter while others shared no common letters with the original item.

The results showed:

1. The effect which recognition and recall have upon each other depends on the temporal order of the test. Recognition is poorer after recall than before recall. On the other hand, weak associations may drop out during the recall test and lower the level of subsequent recognition.

2. The hypothesis that weak associations, below the threshold for active recall, contribute to correct recognition is supported by an analysis of the S's wrong guesses on the recognition test. When S's are forced to guess, incorrect syllables which have two

letters in common with the correct one are chosen considerably more frequently than entirely new syllables (Postman, Jenkins, & Postman, 1948, p. 518).

It can be seen from this study that more errors involved the choice of the more similar alternatives. This should indicate that the alternatives are not equally probable as guesses. It seems possible, therefore, for the student to rule out dissimilar alternatives as being completely wrong and so restrict his choice to the remaining alternatives which are similar to the original items. The method leads to more errors among the similar alternatives than among the dissimilar ones, which seems to increase the probability of getting an item correct by guessing. The guessing correction usually treats alternatives as having the same probability of occurring. The correction factor may underestimate the number of items correctly guessed and overestimate the amount of retention.

3. Those items which are actively recalled have a very high probability of being correctly recognized. This relationship between recall and recognition is asymmetrical. Items which fail to appear in active recall are often recognized correctly.

4. The basic difference between the two tests appears to lie in the minimal strength of association which they require for successful performance. The method of recognition is the more sensitive of the two because it provides a better opportunity for weak association to contribute to S's performance (Postman, Jenkins, & Postman, 1948, p. 518).

Summary

Instruments measuring debilitating anxiety (MAS and

TAS) have shown that a significant negative relationship exists between anxiety and task difficulty, GPA, aptitude, and other measures of intellectual ability for both male and female students under threatening conditions. Facilitating anxiety was found to have a significant positive relationship between aptitude, GPA and other measures of intellectual achievement. The studies, reported here, indicated significant differences between high and low anxious subjects in test situations. No differences were found between groups who differed in scores on anxiety scales in nonthreatening situations on various criteria of performance.

The studies reviewed have shown that the degree of anxiety exhibited by an individual is an element which contributes to his academic success or failure. The relationship that anxiety has with measures of academic performance (aptitude, GPA, final exam grades) is dependent upon the anxiety instrument, properties of the criteria and some characteristics of the student. Some of the research articles are not in agreement as to the contribution anxiety makes to some measures of academic success. Academic performance is influenced by anxiety by affecting the degree to which the individual can make use of his potentialities.

Few studies expressing a significant relationship between anxiety and memory were found. The studies which ex-

explored the relationship between anxiety and memory were conducted under various threatening conditions so that the moderating effects of anxiety on intellectual performance could be determined under the threatening conditions. The results suggested that memory was effected as the level of anxiety increased. No studies were found that showed a relationship between memory and anxiety under nonthreatening conditions. The studies indicate that anxiety under threatening conditions affects performance of students by interacting in a debilitating manner with memory.

CHAPTER III

METHOD

Each subject in the study was given a modified version of the Alpert and Haber (1960) Achievement Anxiety Test. The version of the AAT used in the present study did not include the buffer items which were used in Alpert and Haber's test. Each subject was asked to complete the memory questionnaire, which described the course in terms of number and name. The experimental condition was introduced by instructions explaining the use of the memory questionnaire. No stress was applied to the experimental condition, i.e. no motivational instructions were given that posed personal threat for the student. Sarason (1957) differentiates between stress and non-stress conditions in that the former is subject oriented and the latter is experimenter oriented. Subject oriented instructions are designed to be ego threatening to the subjects. Experimenter oriented instructions are designed to encourage the student to do well on the test as a favor to the experimenter. The present study utilized a variation of the experimenter oriented type of instruction. The student

was requested to do his best in order to facilitate the research study.

Sample

The population used in the present study was defined as the students enrolled in the teacher certification program of the College of Education. Any inferences made from the results of the study must be restricted to the nature of the sample selected from the population. The unit of the population sampled was 263 students enrolled in Educational Psychology - Education 120 - during the spring semester of 1968-69. The course was required of all students in the teacher certification program. The course was taught by three professors who alternated each week the one hour lecture presentations. The students were also required to spend an hour each week in a discussion group conducted by a graduate assistant.

Sample loss. Complete information was available on all but 126 students. The incomplete data on 126 students resulted from a number of causes; some were graduate students, transfers, or students who had returned to school after once dropping out. Other students did not take all their courses from Oklahoma University which made it difficult for them to select the courses taken at other schools from the course listing. Since participation in the study was voluntary, the students who did not fill out the Infor-

mation Blank (those who were absent when the graduate assistant administered the Information Blank) were not used in the sample. Similarly, the scores of zero were not used but will be discussed in Chapter V. Table 1 summarizes data collected and data lost in terms of number of students, sex and kinds of anxiety they evidenced as indicated by the AAT.

Sampling of subjects. The sample of the study was dichotomized by the two aspects of anxiety - facilitating and debilitating. Random sampling was used to obtain an equal number of subjects for each cell. According to Wert, Neidt and Ahmann (1954, p. 177) "The use of equal number of cases in the groups being compared is to be recommended ...". The twelve subjects in the Male-Facilitating cell were taken as the total sample of males in the group. From the group of thirty subjects in the Female-Facilitating cell, twelve subjects were assigned at random to the Female-Facilitating cell. The same procedure was followed for the two remaining cells - Male-Debilitating and Female-Debilitating.

Materials

The study involved the use of a modified version of the Achievement Anxiety Test (AAT) (Alpert & Haber, 1960), and the questionnaire referred to as the Information Blank (IB).

Achievement Anxiety Test. Alpert and Haber (1960)

Table 1

Summary of Data Collected and Data Lost

Anxiety Data Collected (total sample)	263
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Memory Data Collected

Male

Facilitating	12
Debilitating	18
Zeros	2
	<hr/> 32

Female

Facilitating	30
Debilitating	71
Zeros	4
	<hr/> 105

Total

137

Sample Loss

Male

Facilitating	9
Debilitating	13
Zeros	1
	<hr/> 23

Female

Facilitating	34
Debilitating	64
Zeros	5
	<hr/> 103

Total

126

Grand Total

263

constructed the AAT to measure the effects of anxiety experienced in test-taking situations. The instrument was designed to distinguish between the different kinds of anxiety reaction that were evidenced by students. One variety of anxiety facilitated, while the other debilitated the functioning of the student.

Alpert and Haber (1960) show test-retest reliability coefficients, for their test over a ten week and eight month period. "Retest reliability shows that extent to which scores on a test can be generalized over different occasions; the higher the reliability, the less susceptible the scores are to the random daily changes in the condition of the subject or of the testing environment" (Anastasi, 1968, p. 78). The reliability coefficients for a ten week interval for the facilitating and debilitating scales were as high as .83 and .87, respectively. For an eight month period the reliability coefficients were as high as .75 and .76 for the facilitating and debilitating scales, respectively. The reliability coefficients for the ten week interval fall into the range for desirable reliability coefficients (Anastasi, 1968). The reliability coefficients for the ten week interval, therefore, tend to suggest that the AAT may adhere to the underlying assumption, that of being a predispositional state variable, indicated by Alpert and Haber. No validity coefficients were found for the AAT.

The AAT is comprised of two independent scales: a facilitating scale of nine items based on the sample item - "Anxiety helps me to do better during examinations and tests"; and debilitating scale of ten items based on the sample item - "Anxiety interferes with my performance during examinations and tests" (Alpert & Haber, 1960, p. 213). The total scores for each scale of AAT is the cumulative score of the items with the facilitating scale being positive and the debilitating scale being negative. The minimum-maximum (min-max) scores for the group under study ranged from 4-40 for the debilitating scale and 18-33 for the facilitating scale. The min-max scores for the females ranged from 18-33 on the facilitating scale and 10-40 on the debilitating scale. For the males the min-max scores ranged from 19-22 on the facilitating scale and 4-40 on the debilitating scale. A form of the AAT that was used is found in Appendix A.

Information Blank and Course Listing. The memory aspect of the present study is concerned with the amount of retention students have in a non-threatening situation. In order to measure the retention of students in terms of recognizing courses previously taken by the subjects at the University of Oklahoma, an IB was standardized. A data pool of courses taken from various College Bulletins was established from which the student picked the courses he had taken. The data pool was in the form of a course listing. The student, upon reading the list of courses, was asked to

report the courses he had taken, the number of the courses, and to recall the grade and the number of hours received for the course. The list of courses was assembled from the various College Bulletins of the University of Oklahoma. The College Bulletins used were:

1. The College of Arts and Sciences
2. The College of Business Administration
3. The College of Education
4. The College of Engineering
5. The College of Fine Arts
6. The School of Nursing
7. The College of Pharmacy

A study by Vreeland and Bidwell (1966) described a framework for classifying departments. The authors interviewed 127 faculty members for the purpose of acquiring a detailed description "... of the specific aims of existing and proposed undergraduate offerings in the department and an extended discussion of the department's characteristic approach to undergraduate instruction" (Vreeland & Bidwell, 1966, p. 243). Depending upon the responses by the faculty members, two goals subdivided in five categories were identified. The goals were: Technical Goals and Moral Goals. The former was subdivided into Occupational Preparation and Structure of Discipline. The latter was subdivided into Interesting-Exciting, Occupational Ethics and Broadening Humanizing.

Pointed out in the study, however, was that some departments may be affected by bifurcation of goals, i.e. questions often arise as to how scientific or how humanistic a department should be.

The arrangement of disciplines into conventional groupings for the present study was done for three reasons:

(1) to facilitate the categorization of departments into similar areas of concentration,

(2) to simplify the selection of courses by the student,

(3) to eliminate the problem of bifurcation of goals.

The grouping of academic areas was accomplished by relating departments with common disciplines; that is, departments were grouped under a broad heading that indicated the areas that were conceptually related to each other and to the broader area of concentration. No correlation was performed as to whether or not the groupings were representative of the various departments subsumed by the groupings.

The categorization of departments is in accordance with Vreeland and Bidwell (1966, p. 253) who, in referring to the categorization of departments according to the attitude and values the departments hold toward undergraduate students, imply that departments may "... be related to various departmental characteristics other than those employed in this study."

The courses were categorized under seventeen major headings similar to those indicated by Vreeland and Bidwell (1966). For example, the major heading Social Sciences was subdivided into four areas: (1) History, (2) History of Science, (3) Political Science, and (4) Geography. The areas were assigned to Social Sciences because they stressed elements, methods, problems, organization and functions relevant to past and present civilizations and their environments according to the College of Arts and Sciences. In contrast, the major heading Behavioral Sciences was subdivided into: (1) Psychology, (2) Social Work, (3) Sociology, and (4) Anthropology. The areas pertain to the development of man and the processes and problems that man encounters when interacting with other men.

To ensure that all courses taken by students were included in the course listing, transcripts were obtained from the registrar for all the students in the sample. The courses in the transcripts were compared with the Course Listing, thereby ensuring that all the courses were represented by the number of the courses and the name of the courses taken by the students. A copy of the Course Listing is found in Appendix B.

The information obtained from the Course Listing was recorded on the Information Blank which was being used in a broader study. In addition to the categories used in the present study, two other categories - 'level of diffi-

culty' and 'not taken' - were used in the broader study. Attached to the Information Blank was a set of instructions. A copy of the Information Blank and Instructions are found in Appendix C.

Procedure

During the spring semester of 1968-69 a battery of tests was required of all students enrolled in Educational Psychology - 120 course. Since the tests were required of the 263 students in the course, the tests were given in a lecture hall which offered sufficient space for testing all of the students. Three sessions were used to administer the battery of tests. The AAT was administered as one of the tests in the battery. The battery of tests differed from the testing of the Information Blank in that the latter was designed to be administered in a non-stress situation. Testing in a group may have been associated with the battery of tests, posing an ego threat to the students (Sarason, 1957). The instructions at the top of the test were read to the students by the graduate assistant in charge of the session, who also discussed the sample item with the students. The students were asked to circle the number of the item that most clearly characterized his feelings about the question.

Scoring the AAT. The scoring of each item was the

weight given to it by the student. The scores were totaled to give a composite score - one for the facilitating scale and one for the debilitating scale. The debilitating score was then subtracted from the facilitating score resulting in a zero, positive or negative score for each student. The three scores reflected the type of anxiety most likely to be exhibited by the student. The zero score was the result of one of two alternatives: (1) those individuals who were not affected by anxiety in test performance had a low score on both scales or; (2) those individuals who had high scores on both scales.

In the latter part of the spring semester 1968-69, the Course Listing and Information Blank were given to the same group of students who took the AAT. A graduate assistant administered the Course Listing and the Information Blank to thirteen discussion sessions. In the two remaining discussion sessions, two other graduate assistants administered the Course Listing and Information Blank. Three graduate assistants were used because of time conflicts among discussion groups.

Scoring of the Information Blank. The Information Blank was scored by assigning five points per item, one point for each section of the item. An item is defined as the unit consisting of the sections: Department, Course Number, Level of Difficulty, Not Taken, Took Course, Grade Achieved and Hours (Refer to Appendix C). The total num-

ber of points possible depended upon the number of courses on the transcript. The number of sections left blank on each item was the score per item. The item scores were summed for a total score, which represented the sections missed. The total number of items the student should have recorded was multiplied by five, the number of sections per item, giving the maximum number of sections the student could have omitted. The total number of sections was then divided into the actual number of sections omitted, thus giving the percentage missed. According to Wert, Neidt and Ahmann (1954), the use of percentages is justified when the number of cases in a cell cannot be directly compared. Since the total number of items for each student was different, a percentage was used so that a comparison could be made between student's scores. As retention decreased, the percentage became higher; and conversely, as retention increased, the percentage became lower.

By considering anxiety scores as being positive or negative and by looking at the performance of the students on another variable (retention), the effect of assessed anxiety on memory scores may be examined. The hypotheses of no difference between the mean scores on the performance criterion of the two groups was tested by a 2 (facilitating and debilitating) x 2 (male and female) analysis of variance. A two tailed test of significance was used in the study with a .05 confidence level.

The level of confidence is highly arbitrary but common practice has been to use the .05 level in an initial investigation.

CHAPTER IV

RESULTS AND DISCUSSIONS

Results

The results are presented under two sub-headings: preliminary results and final results. The preliminary results show the comparisons between the present study and Alpert and Haber's study with respect to the scales on the AAT (Tables 2 and 3). The comparison of studies is important in order to indicate changes in perception and evaluation of data that have been compiled by different investigators in their attempt to analyze the schematic character of a variable. The present study was compared with Alpert and Haber's (1960) study on the above basis: that is, indicating sources of differences between studies which were formulated on the concept of anxiety developed by Alpert and Haber. Tables 4 and 5 show the means, sd, n's and min-max span of the facilitating and the debilitating scale for male and female students after the subtraction (facilitating scale minus debilitating scale) was performed. Table 6 shows the mean and standard deviations

of the memory scores for the student sample in the study.

Under the final results heading the analysis of variance is presented. Tables 8 and 9 show the results of the memory questionnaire for facilitating and debilitating, male and female anxiety students.

Preliminary results. The study was designed to investigate the effects of anxiety on memory in a nonstress situation. Alpert and Haber's (1960) Achievement Anxiety Questionnaire (AAT) was used to measure the degree and kind of anxiety (facilitating or debilitating) which the student manifested. The two samples were drawn from different and uncorrelated groups. Therefore, a comparison was made by using a "t" test for uncorrelated data between the scales of the AAT and the present study. The comparison was made in order to determine whether there was a difference between the sample means. Since only male subjects were included in the study of Alpert and Haber and both male and female subjects were included in the present study, a comparison of the two studies suggests that sex linked differences could produce some difference in the results. Table 2 shows the means and standard deviations of the facilitating scale for both studies. The mean of the facilitating scale for the present study was 24.14; the mean for the Alpert and Haber study was 27.28. The difference of 3.15 was significant beyond the .01 level of probability ($p < .01$) indicating that the two samples could not be considered as

coming from the same population. The student sample in Alpert and Haber's study tended to score as though they were more anxious than the student sample for the present study. The variance, which is the square of the standard deviation, for Alpert and Haber's study (18.23) was larger than the variance of the present study (16.40). Guilford (1965, p. 185) states, "that if two samples have markedly differing variances the t test is questionable". In order for a valid "t" test to be run between the means of the present study and Alpert and Haber's study a test for homogeneity of variance was performed through the use of the statistic F_{\max} . The result was not significant at the .05 level of probability for both facilitating and debilitating scales indicating that the two samples could have come from two populations that have equal variances.

Table 2
Means and Standard Deviations for the
Facilitating Scale of the AAT

	Present Study	Alpert & Haber	t	F_{\max}
mean	24.14	27.28	7.54*	
sd	4.05	4.27		1.11**
n	131	379		
min-max	18 - 33			

* Significant beyond the .01 level of probability

** Not significant at the .05 level of probability

Table 3 shows that the mean of the debilitating scale for the present study (27.93) was greater than Alpert and Haber's study (26.33). The comparison of the means showed that the difference was significant beyond the .05 level of probability ($p < .05$) indicating that the sample in the present study scored higher on the debilitating anxiety scale than the sample in Alpert and Haber's study. Because of the disproportionality of males (N=30) and females (N=101) in the present study and the results of previous studies that indicate females score higher on the debilitating anxiety scale than males, the results would be expected to favor the present study and account for, in part, the significant difference between the means of the present study and Alpert and Haber's study. A calculation to determine whether or not the significant difference was a result of the disproportionality of females to males would be difficult. Alpert and Haber's study was concerned with the relationship between anxiety and academic performance i.e. grade point average, final examinations, etc. They used a correlational technique for their study. The present study investigated the effects anxiety had on memory for males and female students enrolled in Educational Psychology - Education 120. An analysis of variance was used in the present study. Because of the differences and the type of statistical data reported in each study, no comparison was made.

Table 3

Means and Standard Deviations for the
Debilitating Scale of the AAT

	Present Study	Alpert & Haber	t	F _{max}
mean	27.93	26.33	2.53*	
sd	6.52	5.33		1.50**
n	131	379		
min-max	4 - 40			

* Significant beyond the .05 level of probability

** Not significant beyond the .05 level of probability

Tables 4 and 5 show the results of the facilitating and debilitating scales, respectively, for male and female students. Since a significant difference was found between the present study and Alpert and Haber's study on these scales, an investigation into the distribution of scores by sex was deemed appropriate. Previous findings (Jensen, 1958; Cox, 1964) showed differential reactions by male and female students on various anxiety questionnaires, i.e. Test Anxiety Scale and General Anxiety Scale. The findings in these studies showed that females consistently scored higher than males. Tables 4 and 5 show that the means for males were higher than the means for the female subjects. The computation of "t" for both scales showed no statistically significant difference between male and female subjects beyond the .05 level of probability. Means for the total scores were included in Tables 4 and 5 which show the mean and standard deviations for the two scales of the sample. The minimum

and maximum (min-max) scores for anxiety and memory were included to give an estimate of the variability of the scores.

Table 4

Means and Standard Deviation of Facilitating Anxiety
Scores for Male and Female Subjects

	Male	Female	t	Total
mean	6.42	6.23	0.005*	6.29
sd	5.54	5.18		5.29
n	12	30		42
min-max	19 - 22	18 - 33		

* Not significant beyond the .05 level of probability

Table 5

Means and Standard Deviation of Debilitating Anxiety
Scores for Male and Female Subjects

	Male	Female	t	Total
mean	9.00	8.40	1.19*	8.53
sd	5.49	4.50		4.72
n	18	71		89
min-max	4 - 40	4 - 40		

* Not significant at the .05 level of probability

Table 6 shows the means, standard deviation and "t" value comparison of memory scores between the male and female subjects in the study. Table 6 shows the mean for the male subjects to be 12.54 and the mean for the female subjects to be 8.60. The difference was not significant beyond the .05 level of probability. The total scores show the mean and the standard deviation for scores on the memory questionnaire.

Table 6

Means and Standard Deviations of Memory Scores
For Male and Female Students

	Male	Female	t	Total
mean	12.54	8.60	1.10*	8.95
sd	14.77	14.37		
n	31	106		137
min-max	0.0-60.8	0.0-79.1		

* Not significant beyond the .05 level of probability

Final results. Three null hypotheses were proposed: one, to test for significant differences between the means for facilitating and debilitating anxiety and the second between the means for male and female students. The third null hypothesis was proposed to test interaction between anxiety and sex. A two way analysis of variance was used as the statistical test. The results as presented in Table 7 may be described as follows:

(1) There was no statistically significant difference ($p > .05$) in retention between male and female students in a nonstress situation who were enrolled in Education 120 during the 1968-69 spring semester.

(2) There was no statistically significant difference ($p > .05$) in retention between students in a nonstress situation who were enrolled in Education 120 during the 1968-69 spring semester and who were classified as facilitators or debilitators according to the scores they made on the Achieve-

ment Anxiety Questionnaire.

(3) There was no statistically significant interaction between the variables anxiety and sex. The results suggested that the effect of anxiety was independent of sex; that is, the mean difference was not significantly different from zero between facilitating and debilitating anxiety regardless of the sex of the student.

Table 7

Summary of Analysis of Variance for Testing Main Effects for Anxiety, Sex and Interaction

Source of Variance	df	ss	ms	F	P
Anxiety	1	2.80	2.80	.02	N.S.*
Sex	1	231.44	231.44	1.45	N.S.*
Interaction	1	14.08	14.08	.09	N.S.*
Within Groups	44	7026.45	159.69		
Total	47	7274.77			

* Not significant at the .05 level of probability.

Tables 8 and 9 relate to the F test results shown in Table 7. Since no significant differences resulted from the F tests, no "t" tests were used for Tables 8 and 9.

Table 8 shows the means and standard deviations of memory scores for male and female facilitating anxiety students on the Memory Questionnaire.

Table 8

Means and Standard Deviations of Male and Female Facilitating Anxiety Students on the Memory Questionnaire

	Male	Female
mean	11.82	6.34
sd	13.11	9.93
n	12	12
min-max	0.0-44.2	0.0-29.1

Table 9 shows the means and standard deviations of memory scores for male and female students with debilitating anxiety on the Memory Questionnaire. Table 9 shows that the mean for the male subjects (10.25) was larger than the mean for the female subjects (6.94). The difference between the means was not significant at the .05 level of probability as indicated by Table 7.

Table 9

Means and Standard Deviations of Male and Female Debilitating Anxiety Students on the Memory Questionnaire

	Male	Female
mean	10.25	6.94
sd	16.01	7.66
n	12	12
min-max	0.0-60.8	0.0-79.1

Discussions

The results of the investigation show that although differences exist on retention scores between facilitating and debilitating male and female students, none of the F ratios obtained in the study were statistically significant. The indication was, therefore, that anxiety scores as measured by the AAT were not shown to affect retention in a nonstress situation with Education 120 students. In the discussion of why the null hypotheses failed to be rejected, three aspects will be considered: The AAT was not appropriate, the AAT was insensitive to the nonstress situation as defined in the present study, and sample characteristics.

The instrument was not appropriate. The present study was based upon the theory that anxiety is a predispositional state variable. That is, an individual is predisposed to become anxious in certain situations. Within the construct of anxiety, Mandler and Sarason (1952) and Alpert and Haber (1960) formulated their concept of anxiety. Both concepts consider anxiety to be a strong drive which is situationally evoked. Mandler and Sarason indicate that measurable anxiety responses are debilitating to performance whenever the responses are aroused in an examination. Within the concept, the debilitating scale constituted all anxiety pertaining to testing situations. As mentioned earlier (Chapter II, p. 29) Mandler and Sarason indicated that the study of anxiety should be an examination in depth of a particularly stressful situation, i.e.

test taking. The concept of anxiety appears to imply that in non-threatening situations anxiety should be at a minimum, if present at all.

The concept postulated by Alpert and Haber was that anxiety not only could debilitate but it also could facilitate academic performance. Within the concept, the debilitating and facilitating scales of anxiety constitute all anxiety pertaining to test-taking situations. One implication for the facilitating scale appears to be that in nonstress situations when debilitating anxiety is at a minimum, facilitating anxiety should show some indication of improving student's performance.

If the conclusion suggested in this section is correct, that the AAT was inappropriate, the present study substantiates the concept of anxiety as proposed by Mandler and Sarason. That is, under non-threatening situations Mandler and Sarason (1952) imply that no differences should exist in performance by students who were categorized as debilitators according to their responses on the anxiety questionnaire. Under the conclusions for the AAT, facilitating anxiety would contribute to the academic performance of students in a non-threatening situation. In the present study, facilitating anxiety did not contribute to the performance of students. Against the criterion of retention and not of achievement, the present study failed to support Alpert and Haber's concept of anxiety.

The AAT was insensitive. The interpretation by Mandler and Sarason and Alpert and Haber implied that the tests, the TAQ and the AAT, were sensitive to ego-threatening situations. No studies were found, however, that compared the AAT in threatening and non-threatening conditions. Studies by Axelrod, Cowen and Heilizer (1956) and I. G. Sarason (1957a) indicate that no difference in scores exists among groups on anxiety scales when tested under non-threatening conditions. However, the AAT may not have two completely discrete scales but overlapping scales which tend to mask unknown variables which may exist and tend to effect the discriminating ability of the facilitating scale and debilitating scale under non-threatening situations.

Research by Pervin (1967) and Alpert and Haber (1960) has indicated that the AAT measures the moderating effects of anxiety and aptitude on academic performance. Studies investigating the effects of anxiety on academic performance used mid-term grades, final grades, grade-point averages and similar forms of ability measures. In contrast, the present study used retention as an indicator of academic performance. Since significant differences were reported by Pervin (1967) and by Alpert and Haber (1960) in Chapter II, pages 36 and 40 between anxiety and indices of performance and no significant differences were found in the present study, an implication is that memory, as measured, is not moderated by anxiety, as measured.

A second implication is that the effects of anxiety on performance varies with different situations and with different measures. A lack of sensitivity in differentiating between the scores on the AAT for males and females could be attributed to the nonstress situation in which no direct stress was perceived in the students under the conditions described in the study; in which case, the AAT could be insensitive to situations that span areas which include non-threatening and threatening experiences for Education 120 students. The observation of the experiences would be consistent with anxiety conceived as a predispositional state variable as discussed in Chapter II, page 28.

Sample characteristics. The presents study's sample was contrasted with Alpert and Haber's study by comparing the mean scores of students on the facilitating and debilitating scales of the AAT. Table 2 shows that the mean of the scores of the facilitating scale for students in the present sample was significantly lower than the mean of the scores of the facilitating scale for students in Alpert and Haber's sample. An implication was that students in the present study exhibit less facilitating anxiety than the students in Alpert and Haber's study. Table 3 shows that the mean of the scores of the debilitating scale for the present sample was significantly higher than the mean of the scores of the debilitating scale for Alpert and Haber's sample. An implication was that the students in the present study exhi-

bited more debilitating anxiety than students in Alpert and Haber's study. The information in Tables 2 and 3 indicates, therefore, that the characteristics of the samples were different. The difference in sample characteristics between the present study and Alpert and Haber's study was emphasized by reviewing studies that used the AAT.

Many of the studies (Pervin, 1967; Dember, Nairne, & Miller, 1962; Alpert & Haber, 1960) on anxiety that used the AAT for the measurement of anxiety used only male students in the sample. Consequently, no comparison was possible between male and female students on the two scales of the AAT. Comparability of findings on the use of the AAT between males have been difficult since few studies report means, standard deviation or a min-max span of scores for the instrument. An interesting fact to note is that the students in the samples, used in most of the other studies, were selected from the psychology department whereas in the present study the sample was selected from students in the teacher certification program of the College of Education. Several interesting questions arise: Is there a difference in student population between the College of Education and the psychology department on a measure of retention in threatening and non-threatening situations? Do students who have been accepted into the teacher certification program in the College of Education tend to exhibit more anxiety in threatening situations than psychology students? The questions

suggest not only distant consequences for the student, but also suggest revisions in the requirements for entering the teacher certification program, i.e. guide lines for evaluating the students, especially those prone toward debilitating anxiety.

In summary, the following conditions seem to exist: The AAT appears to be an insensitive measurement of anxiety under non-threatening situations. The AAT appears to be insensitive in terms of the criterion variable. No differences were found between the scores on the facilitating and debilitating scales of the AAT on the criterion variable. The AAT appears to be insensitive for Education 120 students in a non-threatening situation.

Implications for further research. Studies have demonstrated that academic performance of students may be effected by anxiety. The results of the present study suggest that it would be significant for a researcher to compare the effects of facilitating anxiety under threatening and non-threatening conditions. Such a study would examine the question of whether the facilitating anxiety scale is sensitive enough to differentiate between threatening and non-threatening situations.

Another area for a researcher would be to examine the moderating effect of anxiety on memory in classroom testing situations under non-threatening situations. Because the definition of a non-threatening situation given by I. G. Sarason (1957a) was not validated, a suggestion is made that in a

testing situation the non-threatening condition should be validated in some way, i.e. questionnaire.

An investigation of the effects of anxiety on students who have been admitted into the teacher certification program and the students who have been admitted into the department of psychology may yield useful results for ascertaining criterion measures for entering into the fields of education and psychology.

Research is also recommended on the significance of zero scores obtained by students on the AAT. Do students who make a score of zero on the AAT perform better in classroom situations than students who make a high score on the facilitating scale of the AAT?

Since various methods exist as to the grouping of departments, further research is needed to establish inter-judge reliability of the categories under which are grouped various departments at the University of Oklahoma.

CHAPTER V

SUMMARY AND CONCLUSIONS

Summary. The purpose of the study was to investigate the effect which anxiety, as measured by the AAT, had on retention as measured by the memory questionnaire in a non-stress situation. Previous studies of the effects of anxiety and memory have indicated that retention was effected by anxiety (Bush, 1954; Mayer, 1959). However, the frame of reference within which these studies were conducted was that of an interfering response interpretation of anxiety. Anxiety response tendencies were aroused by personal threatening conditions in the environment. The response interfered with on-going-task relevant activity and led to a lowering of performance level. The anxiety responses were assumed to be aroused by stressful conditions.

The present study was conducted within the framework of Mandler and Sarason's (1952) conception that anxiety was a strong learned drive, situationally evoked. More specifically, the approach taken in this study followed the concept represented by Alpert and Haber (1960). Anxiety, according

to Alpert and Haber, was not only characterized by its debilitating effect upon a student's performance, it also had a facilitating effect upon the student's performance. That is, anxiety was dichotomized into debilitating anxiety - anxiety that tended to inhibit test taking performance, and facilitating anxiety - anxiety that tended to enhance test taking performance. From their concept of anxiety, Alpert and Haber constructed the AAT.

The items on the AAT were selected in such a manner that the scales could be used to predict several performance criteria i.e. grade point average, final examination grades, etc. Responses to the items included in both scales, were weighted and each scale summed to give a composite score. Because of the independence of the two scales, the debilitating anxiety score was subtracted from the facilitating anxiety score yielding a single score for each student. If a student had a positive score he was considered to possess facilitating anxiety. The higher the score the higher the degree of facilitating anxiety. Conversely, if a student had a negative score he was considered to possess debilitating anxiety. The lower the score the higher the degree of debilitating anxiety.

The dependent variable was measured by a memory questionnaire which was designed to measure the students' memory of the courses they had taken since entering the University of Oklahoma. The number and name of all courses were given to the students in the form of a Course Listing booklet. Mem-

ory was thus measured by recognition. The Course Listing was divided into seventeen major headings. Within each of the sections were the courses that were related to each category as described by the several college bulletins. The score on the Information Blank was the total number of sections omitted on each line of the Information Blank. The lower the recognition score the better the memory; and conversely, the higher the recognition score the poorer the memory.

The sample for the study consisted of 263 male and female students enrolled in Education 120 at the University of Oklahoma during the spring semester of 1968-69. The students were given the AAT while in a group testing situation; the Information Blank was administered during regular class periods.

A two-way analysis of variance of a 2 x 2 factorial design was used as the major statistical test. The F-ratios for difference between anxiety scales and the difference between sexes was not found to be statistically significant at the .05 level of probability. No statistically significant interaction was found between anxiety and sex.

Conclusions. Six scores of zero were not accounted for in Chapter III, page 82, under the section Sample loss. Based upon the Alpert and Haber study (1960, p. 213), the AAT "measures the presence and intensity of both kinds of anxiety responses, those which facilitate performance and

those which interfere with it". An implication wherein a zero score could have occurred is that an increase in task performance was counteracted by a decrease in task performance drive. Thus, if anxiety can be regarded as a drive variable related to scholastic performance, different functional relationships between anxiety and memory may result from different classroom environments. Students within the environments could manifest different anxiety reactions as indicated by the AAT. The reactions to anxiety may have their sources in the manner which the student perceives a change in the scholastic environment. A course may be inherently difficult and create a challenge to succeed for the student. The same difficult course, because of the personality characteristics of the teacher and the student, might tend to interfere with the performance of the student. If such events do occur, reactions quantified by the scores on the two scales could reflect the ambivalence exhibited by the student in ego-threatening situations. An assumption is, therefore, that students who score the same on both scales of the AAT, perceive similar threatening situations differently. The dual stress for achievement and the personality characteristics of the teacher may be thought to account for the maintenance of facilitating and debilitating anxiety levels in a given situation for some students. The zero scores do not appear to indicate whether a student is affected by facilitating anxiety or debilitating anxiety or whether he is

affected by anxiety to any significant degree at all. The interpretation is in agreement with the conclusions that under non-threatening conditions the scales of the AAT are not sensitive enough and tend to mask some unknown variables that may have an effect on the student's retention.

The null hypothesis of no statistically significant difference between the means of recognition scores for male and female students on a memory questionnaire failed to be rejected.

The null hypothesis of no statistically significant difference between the means of recognition scores, as measured by a memory questionnaire, for the facilitating and debilitating scales of anxiety failed to be rejected.

The null hypothesis of no statistically significant interaction between sex (males and females) and anxiety (facilitating and debilitating) failed to be rejected.

Three reasons for being unable to reject the null hypotheses were discussed in relation to the inadequacy of the instrument (AAT), the lack of sensitivity of the instrument (AAT), and characteristics of the sample. Several suggestions were made pertaining to the above reasons of why the null hypotheses failed to be rejected. They were:

- (1) The effects of anxiety differ with differing situations. It was concluded, therefore, that retention as measured by a memory questionnaire under non-threatening conditions was a situation that precluded the use of the AAT.

(2) The AAT may not have two completely discrete scales sensitive enough to differentiate between facilitating and debilitating anxiety in non-threatening situations.

(3) The present study's sample indicated that Education 120 students at the University of Oklahoma possessed less facilitating and more debilitating anxiety than did the psychology students used by Alpert and Haber. Some questions were raised as to whether or not students who have been accepted into the teacher certification program in the College of Education tend to exhibit more or less anxiety than do psychology students. The sample characteristics tend to indicate the importance of considering group differences in anxiety for the various departments of the University of Oklahoma.

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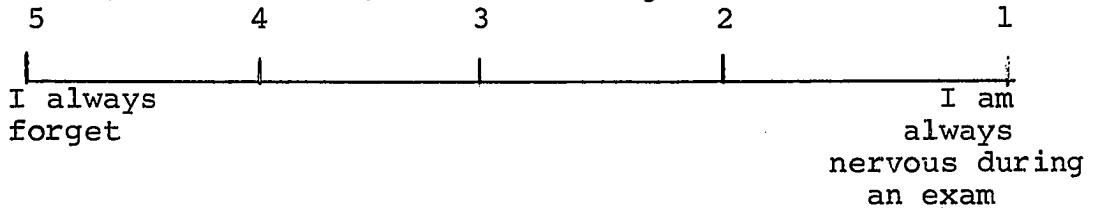
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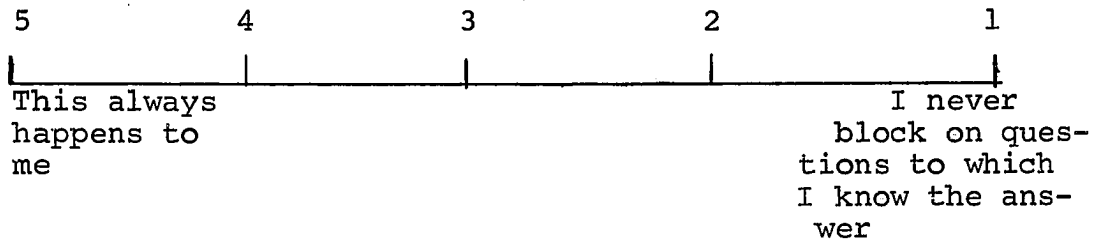
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APPENDIX A
ACHIEVEMENT ANXIETY TEST

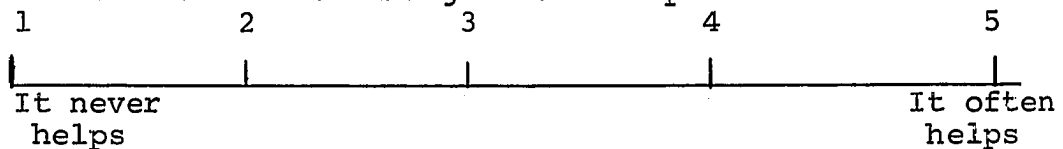
6. While I may (or may not) be nervous before taking an exam, once I start, I seem to forget to be nervous.



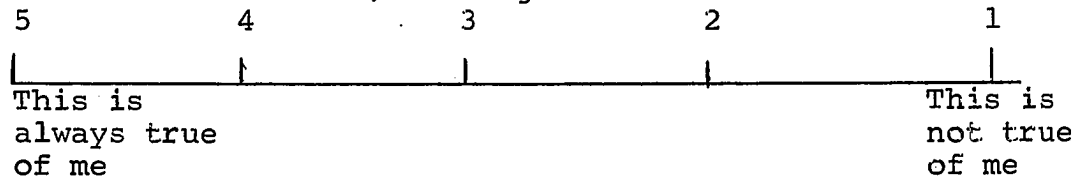
7. During exams or tests, I block on questions to which I know the answers, even though I might remember them as soon as the exam is over.



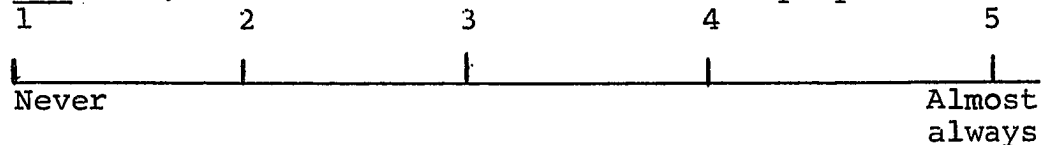
8. Nervousness while taking a test helps me do better.



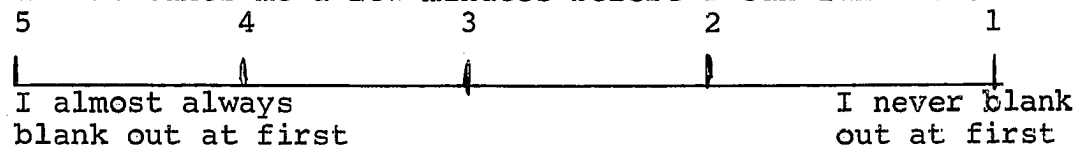
9. When I start a test, nothing is able to distract me.



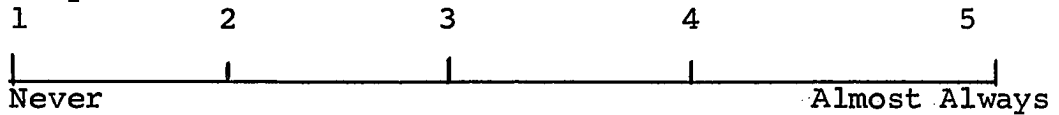
10. In courses in which the total grade is based mainly on one exam, I seem to do better than other people.



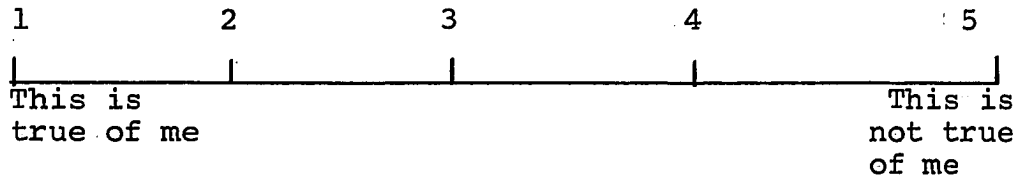
11. I find that my mind goes blank at the beginning of an exam, and it takes me a few minutes before I can function.



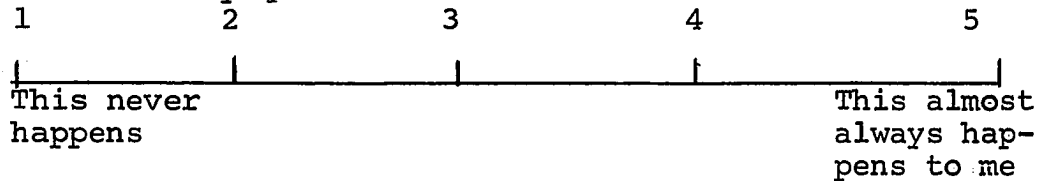
17. I find myself reading exam questions without understanding them and I must go back over them so that they will make sense.



18. The more important the exam or test, the better I seem to do.



19. When I don't do well on a difficult item at the beginning of an exam, it tends to upset me so that I block on even easy questions later on.



APPENDIX B
COURSE LISTING

COURSE LISTING

Aviation

- 91 Primary Flying
- 92 Secondary Flying
- 93 Advanced Flying

Behavioral Sciences

Anthropology

- 1 General Anthropology
- 51 Origins and Development
- 52 Prehistoric Foundations of Civilization
- 110 Native Peoples of the World
- 162 The South American Indian
- 163 Cultural Change

Psychology

- 1 Elements of Psychology
- 91 Introduction to Personality
- 100 General Experimental Psychology
- 136 Industrial Psychology
- 140 Developmental Psychology
- 180 Introductory Social Psychology
- 205 History of Psychology
- 225 Psychological Tests and Measurements
- 291 Foundations of Personality

Social Work

- 61 Introduction to Social Work
- 62 Introduction to Social Group Work
- 162 Introduction to Social Casework
- 262 History of Social Work

Sociology

- 1 Introduction to Sociology
- 52 Social Problems: Deviancy and Social Dis-
organization
- 106 Language and Culture

107	The Family
113	Urban Sociology
114	Minority Groups
121	The Individual and Society
130	The Sociology of Crime and Delinquency
180	Introductory Social Psychology
221	Collective Behavior
222	Social Movements
226	Directed Readings

Business

Accounting

51	Elementary Accounting
52	Elementary Accounting
55	Elementary Accounting
111	Managerial Accounting
200	Intermediate Accounting
201	Intermediate Accounting

Business Adm.

Business Communication

41	Business Communication
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Business Law

140	Contracts: Agency
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Economics

10	Economic Development of the United States
41	Principles of Economics
42	Principles of Economics
84	Elements of Statistics
152	The United States in the World Economy
252	International Economics

Finance

50	Personal Finance
154	Business Finance

Management

151	Principles of Organization and Management
-----	---

Marketing

100 Principles of Marketing

Off. Adm.

10 Business Mathematics
 21 Principles of Shorthand
 22 Principles of Shorthand
 31 Typewriting
 32 Production Typewriting
 123 Shorthand Dictation
 133 Shorthand Transcription
 140 Records Administration
 201 Office Management
 243 Office Machines

Communication

Speech

1 The Fundamentals of Speech
 11 Phonetics
 31 Advanced Public Speaking
 47 Principles and Methods of Discussion
 51 Argumentation and Debate
 59 Introduction to the Study of Speech
 75 Oral Interpretation of Children's Literature
 77 Introduction to Broadcasting
 87 Broadcasting and Society
 97 Diction of Broadcasters
 99 Bases of Speech Behavior
 129 Introduction to Speech Correction
 139 Clinical Procedures in Speech Correction
 167 Basic Television Production
 213 Anatomy and Physiology of Speech
 229 Orientation to Speech Handicapped Children
 255 Speech in the Elementary

Journalism

- 41 Basic News Media and Techniques
- 42 News Gathering and Presentation
- 51 Typography and Printing Processes
- 52 Introduction to Advertising
- 53 Fundamentals of Photography
- 101 News Editing
- 127 Radio and Television Advertising

Library Science

- 51 Use of the Library
- 220 Libraries in the Social Order
- 221 Cataloging and Classification
- 223 Book Selection and Acquisition
- 308 Books and Materials for Children

EducationEducation

- 52 The School in American Culture
- 101 Health Education
- 120 Psychology in Education
- 121 Psychology of Childhood
- 122 Psychology of Adolescence
- 141 Curriculum and Instruction in the Secondary School
- 181 Principles of Business Education
- 220 Education of Exceptional Children
- 242 Language Arts in Elementary Schools
- 241 Social Studies in Elementary Schools
- 300 Field Studies in Education

EngineeringArchitecture

- 8 Design I
- 15 Nature and Use of Materials
- 18 Design II
- 41 Design III

55	Architectural Graphics I
56	Architectural Graphics II
61	Design IV
77	Elements of Structure
105	Wiring and Illumination
109	History of Ancient Architecture
110	History of Medieval Architecture
126	Building Sanitation
162	Design V
166	Design VI
221	Architectural Structures
252	Specifications and Contracts
Chemical Engineering	
140	Chemical Engineering Fundamentals
Civil Engineering	
10	Elementary Surveying Theory
11	Elementary Surveying - Field
113	Mechanics for Architects
Nuclear Engr.	
Aerospace & Mechanical Engr.	
Metallurgical Engr.	
Environmental Science and Public Health	
Electrical Engr.	
Engineering	
Bio-medical Engr.	
Computer Science	
Engineering Mechanics	
System Engr.	
Industrial Engr.	
Petroleum Engr.	
Regional & City Planning	
Geological Engr.	

English

English

- 1 Junior English Proficiency Examination
- 5 Grammar and Composition Review
- 11-12 Composition for Foreign Students
- 21-22 Principles of English Composition
- 32 Principles of English Composition
- 50 English and American Masterpieces
- 53 English Literature from 1375 to 1660
- 54 English Literature from 1660 to 1800
- 55 English Literature from 1800 to 1925
- 60 English Usage
- 61 Expository Writing
- 103-104 American Literature
- 101 Readings in World Literature
- 107-108 The Literary Study of the English Bible
- 120 Technical Writing
- 193 Introduction to Shakespeare
- 216 Modern Continental Drama
- 221-222 Chaucer
- 305 Old English Prose and Poetry
- 337 The English Novel in the Eighteenth Century
- 370 Modern English Prose
- 372 The American Novel

Philosophy

Philosophy

- 1 Introduction to Philosophy
- 2 Philosophies of Social and Religious Morality
- 3 Elementary Logic
- 51 Philosophy of Human Culture
- 54 Introduction to Sources of Philosophy
- 101 Systematic Philosophy
- 103 Logic and Scientific Method
- 105 Ethics

106	Ethics of Social Ideals and Policies
107	Philosophy of Religion
109	Aesthetics and Philosophy of Art
135	History of Greek and Roman Philosophy
151	Religious Philosophies of the West to 400 AD
152	Religious Philosophies of the West after 400 AD
153	Oriental Philosophy and Religion
157	Philosophy of History
203	Symbolic Logic

Fine Arts

Fine Arts

27	Introduction to the Arts
28	Introduction to the Arts

Art

1	Basic Drawing
2	Basic Drawing
3	Analysis of the Visual Arts
11-12	Basic Design
20	Freehand Drawing
21	Theory of Design and Color
31-32	Basic Form
41-42	Life Drawing - Beginning
61-62	Lettering
73-74	Sculpture - Beginning
81-82	Advertising Design - Beginning
93-94	Painting - Beginning
176	Ceramic Design
251	Public School Art
265	Special Problem

Drama

1	Beginning Acting for Stage and Television
2	Voice and Diction for Stage and Television
6	Make-up for Stage and Television
8	Beginning Oral Interpretation

- 9 Basic Stagecraft and Production Practice
for Stage and Television
- 10 Advanced Stagecraft and Production Practice
for Stage and Television
- 21 Technical Production for High School Plays
- 22 Play Directing for High School
- 29 Understanding the Theatre
- 30 Rehearsal and Production
- 50 Graphic Techniques for Design in the Theatre
- 77 Introduction to Broadcasting (Same as Speech 77)
- 87 Broadcasting and Society (Same as Speech 87)
- 97 Diction for Broadcasters (Same as Speech 97)
- 131 History of the Theatre
- 189 Basic Lighting for Stage and Television
- History of Art
 - 29 The Understanding of Art
 - 33 General Survey I
 - 34 General Survey II
 - 115 Baroque Art
 - 117 Nineteenth Century Art
 - 220 Primitive Art
- Dance
 - 5 Introduction to Ballet
 - 25 Ballet Technique
 - 55 Intermediate Ballet Technique
 - 56 Beginning Modern Dance
 - 57 Intermediate Modern Dance
 - 58 Advanced Modern Dance
 - 205 Ballet Company Class
- Music
 - 29 The Understanding of Music
- Music Literature
 - 31-32 Introduction to Music Literature

Music History

51-52 History of Music

Music Theory

- 1 Beginning Harmony
- 2 Beginning Harmony
- 8 Fundamentals of Music
- 9 Beginning Aural Theory
- 10 Beginning Aural Theory
- 17 Intermediate Aural Theory
- 18 Intermediate Aural Theory
- 19 Vocal Music Reading
- 21 Intermediate Harmony
- 22 Intermediate Harmony
- 265 Forms and Analysis

Music Education

- 3 Music Skills for Classroom Teachers
- 4 Music Materials and Methods for Classroom Teachers
- 201 Music in the Elementary School

Music Applied

- 10 Unclassified Piano, Violin, etc.
- 100 Freshman and/or Sophomore Piano, Violin, etc.

Music Technique

- 10 Recital Attendance
- 19-20 Piano Sight Reading
- 91 University Band
- 92 University Orchestral
- 93 Men's Glee Club
- 94 Women's Choral Club
- 95 University Choir
- 96 University Chorus
- 97 Studio Accompanying for Piano Majors
- 100 Opera Workshop
- 103 Singers Diction

- 118 Woodwind Instrument Class
- 121 Beginning Piano
- 125 Beginning Piano Study II
- 126 Intermediate Piano Study I
- 134 Instrumental Ensemble
- 213 Conducting
- 314 Choral Conducting
- 311 Opera Coaching

Health, Physical Education and Recreation

- 1 Adaptive Physical Education
- 3 Conditioning Exercises
- 5 Body Mechanics
- 11 Archery
- 12 Beginning Bowling
- 13 Intermediate Bowling
- 15 Beginning Golf
- 16 Intermediate Golf
- 18 Beginning Tennis
- 19 Intermediate Tennis
- 20 Badminton
- 22 Handball
- 23 Beginning Tumbling and Gymnastics
- 24 Intermediate Tumbling and Gymnastics
- 26 Beginning Fencing
- 27 Intermediate Fencing
- 29 Wrestling
- 30 Team Sports
- 31 Team Sports
- 35 Recreational Activities
- 40 Beginning Swimming
- 41 Intermediate Swimming
- 42 Advanced Swimming and Diving
- 43 Senior Life Saving
- 44 Water Safety Instruction

- 50 Beginning Group and Folk Dancing
- 51 Intermediate Group and Folk Dancing
- 61-62 Fundamental Skills in Physical Education Activities
- 63-64 Fundamental Skills in Physical Education Activities
- 85 First Aid
- 90 Materials and Methods in the Elementary School Physical Education Program
- 91 Camp Organization and Leadership
- 93 Methods and Materials in Recreation Leadership
- 104 Theory of Gymnastics
- 105 Theory of Baseball
- 106 Theory of Football
- 107 Theory of Basketball
- 108 Theory of Track and Field
- 183 Methods and Materials in Teaching Sports Activities
- 197 Sports Officiating
- 198 Sports Officiating
- 250 Care and Prevention of Athletic Injuries
- 292 Tests and Measurements in Physical Education
- 299 Organization and Administration of Health and Physical Education

Home Economics

- 3 Design and Color
- 4 Dialectics of Fashion
- 8 Elementary Nutrition
- 10 The Child in the Home
- 25 Housing, Planning, and Furnishing the Home
- 32 Textiles
- 36 Graphic Communication of Fashion
- 37 Costume Illustration
- 38 The Arts of Costume Selection
- 40 Fundamentals of Clothing Construction

47	Interior Drawing
48	Room Composition
50	Design of Properties for Use in Display
51	Household Equipment
52	Family Health
53	Marriage and Family Relationships
100	Consumer Problems in Family Economics
106	Advanced Food Preparation and Service
144	Clothing Construction-Flat Pattern Designing
148	Period Interiors
245	History of Furniture and Accessories
254	Child Development

Modern Language

French

1-2	Beginning French
3-4	French Reading
11-12	Beginning French for Reading
23-24	French Composition
107	French Conversation
123	French Phonetics
211	Advanced French Composition
215	Survey of French Literature to 1800
216	Survey of French Literature (Continued)

German

1-2	Beginning German
3-4	Modern German Prose and Poetry
11-12	Beginning German for Reading
23-24	German Composition
211	Advanced German Literature

Italian

1-2	Beginning Italian
23-24	Italian Composition
51	Readings in Italian
3-4	Italian Reading

Japanese

- 9-10 Beginning Japanese
- 51 Readings in Japanese

Latin

- 1-2 Beginning Latin
- 3 Latin Readings
- 4 Vergil - Selections from Aeneid
- 113 Lyric Poetry: Catullus and Others
- 204 Drama: Plautus, Terence, Seneca
- 209 Historians: Livy, Tacitus, Caesar, Sallust

Portuguese

- 1-2 Beginning Portuguese
- 3 Portuguese Reading
- 51 Readings in Portuguese

Russian

- 1-2 Beginning Russian
- 3-4 Russian Readings
- 23-24 Russian Composition
- 51 Readings in Russian
- 226 Directed Reading

Spanish

- 1-2 Beginning Spanish
- 3-4 Spanish Reading
- 23-24 Spanish Compositions
- 107 Spanish Conversation
- 123 Spanish Phonetics
- 211 Advanced Spanish Composition
- 215 Survey of Spanish Literature to 1700
- 216 Survey of Spanish Literature (Continued)
- 217 Survey of Spanish American Literature

Greek

- 1-2 Beginning Greek

Classical Culture

- 11 Latin Derivative
- 16 Medical Vocabulary
- 38 Classical Mythology
- 152 Latin Literature in English: Epic and Satire

Hebrew

- 9-10 Beginning Hebrew
- 51 Readings in Hebrew
- 110 Hebrew Civilization

Medical Sciences**Pharmacy**

- 7-8 Orientation in Pharmacy

Physical Therapy

- 51 Introduction to Physical Therapy

Military Science**Aerospace Studies**

- 21 First Year Basic Aerospace Studies
- 22 First Year Basic Aerospace Studies - World Military Systems
- 51 Second Year Basic Aerospace Studies - World Military Systems
- 52 Second Year Basic Aerospace Studies - World Military Systems

Military Science

- 11 First Year Basic Military Science
- 12 First Year Basic Military Science
- 21 Second Year Basic Military Science
- 22 Second Year Basic Military Science
- 131 First Year Advanced Military Science
- 132 First Year Advanced Military Science
- 242 Second Year Advanced Military Science

Naval Science

- 1 Orientation and Sea Power
- 2 Orientation and Sea Power
- 21 Naval Weapons

132 Naval Operations

141 Naval Machinery

Natural Sciences

Astronomy

51 Elements of Astronomy.

52 Spherical Trigonometry

Geology and Geophysics

1 General Geology

2 Historical Geology

83 Elementary Mineralogy

84 Elementary Petrology

Mathematics

1 Remedial Mathematics

2 Intermediate Algebra

3 Plane Geometry

5 College Algebra

21 Mathematical Analysis I

22 Mathematical Analysis II

45 Elementary Functions and Coordinate Geometry

46 Introductory Calculus

70 Arithmetic for Elementary Teachers

101 Calculus III

103 Mathematical Analysis III

104 Mathematical Analysis IV

117 Introduction to Computer Science

119 Introduction to Mathematical Statistics

125 Introduction to Abstract Algebra

211 College Geometry

219 Principles of Mathematical Statistics I

223 Elementary Differential Equations

225 Linear Algebra

246 Multivariable Calculus and Differential
Equations

261 Vector Analysis

Physics

- 4 Physical Science for Teachers
- 5 General Physics - Brief Course
- 30 General Physics Laboratory
- 41 General Physics - Mechanics, Sound, Health
- 42 General Physics - Electricity, Magnetism,
Light, Atomic Physics
- 51 General Physics for Engineering and Science
Majors
- 52 General Physics for Engineering and Science
Majors

Physical Sciences

Botany

- 1 General Botany
- 4 Biology for Teachers
- 21 Plant Kingdom
- 53 Flora of Oklahoma

Chemistry

- 1-2 General Chemistry
- 3 General Chemistry
- 6 Chemistry for Non-Science Majors
- 61 Introduction to Chemistry of Nutrition
- 102 Organic Chemistry
- 103 Organic Chemistry

Microbiology

- 181 Principles of Microbiology and Experimental
Microbiology
- 224 Mycology (Same as Botany 224)

Physiology

Zoology

- 1 Introductory Zoology
- 4 Biology for Teachers (Same as Botany 4)
- 9 Invertebrate Zoology
- 20 Comparative Vertebrate Anatomy
- 25 Human Anatomy

- 112 Human Physiology
- 134 Heredity

Social Sciences

History

- 3 United States, 1492 to 1865
- 4 United States, 1865 to the present
- 8 Survey of Ancient and Medieval Europe
- 9 Europe, 1500 to 1815
- 10 Europe since 1815
- 70 History of the Far East to 1800
- 71 History of the Far East, 1800 to the present
- 112 History of Oklahoma
- 151 England to 1603
- 173 History of Southeast Asia
- 201 History of Science
- 130 Colonial Hispanic-American History, 1492-1810
- 117 Survey of Russia
- 171 History of Japan
- 209 Western Europe - Age of Absolutism, 1649-1789
- 217 Europe, 1870-1918
- 215 Europe During the French Revolution and Napoleon
- 310 United States Diplomatic History to 1900
(Same as Pol. Sc. 310)
- 370 Twentieth-Century China

History of Science

- 201 History of Science to the Age of Newton
- 202 The History of Science Since 1700

Political Science

- 1 Government of the United States
- 2 Political Systems in the Modern World
- 11 National Politics - Current Issue
- 30 State Government
- 40 American Political Parties

50	International Relations
80	Introduction to Law Enforcement
150	The Great Powers in World Politics
155	Current World Problems
170	Development of Political Thought
252	International Law
264	The Soviet Political System
270	Political Thought in the Nineteenth Century
312	Problems in American Foreign Policy
324	Jurisprudence - A Study of Legal Theory
372	Contemporary Political Theory
Geography	
1	Physical Geography
42	Principles of Economic Geography
61	Geography for Elementary Teachers
91	Cartography - Map and Photograph Analysis
100	Human Geography
112	Political Geography
121	World Geography by Regions

APPENDIX C
INFORMATION BLANK AND INSTRUCTIONS

Instructions for Information Blank

In order to be admitted into the teacher certification program, students are expected to take various courses that will satisfy the requirements for the degree which they are pursuing. It is essential, therefore, that a student know which courses he has taken so that he may select his future courses more effectively.

As part of a research project being conducted by the College of Education, we are interested in ALL of the UNDERGRADUATE courses that you have taken at the University of Oklahoma prior to entering into the teacher program. Courses to be rated should include all courses taken through the first semester of 1968-69 school year. DO NOT include courses in which you are currently enrolled. DO NOT include courses that have been taken at other institutions. If you are not sure of a course, grade or the number of hours received leave the appropriate blank empty.

Please rate those departmental courses that you have taken and those that you know about, either by hearsay or reputation, as to their level of difficulty, i.e. easy - hard. The booklet of Course Listing given to you has some of the courses that you are expected to have completed. Please look through this booklet and pick the courses that apply and enter them on the attached information blank. Those courses which were dropped and not taken again should be included. Of the courses taken twice, the last one should be included. The filling out of this information blank should not take more than 10 or 15 minutes.

The information blank should be filled out in the following manner:

- I. Heading - Left to Right
 - a. Name: Print last name first
 - b. Class: Freshman, Sophomore, Junior, Senior

- c. Identification Number: in space marked I.D.
- II. Columns - Left to Right
- a. Departmental courses: in space marked De-
partment, i.e. EDUC.
 - b. Number of course: in space marked course
number, i.e. 120
 - c. Level of Difficulty: place between the slash
marks a check indicating the difficulty
level of the course, / /
 - d. Not Taken: place check in this box if this
course was not taken by you.
 - e. Took Course: place check in box if this
course was taken by you.
 - f. Grade Achieved: grade received in this
course, i.e. A, B, C, D, F
 - g. Hours: number of hours received for the
course, i.e. 4, 3, 2, 1, 0