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Response Speed; A Function Of Motives And Expectancies

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RESPONSE SPEED: A FUNCTION OF MOTIVES AND EXPECTANCIES

by

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ABSTRACT

This study is an attempt to integrate the concepts of motivational disappointment (Feather, 1963) and frustrative nonreward (Amsel, 1958). Specifically it is to determine whether personality variables such as motive to achieve success and motive to avoid failure have predictable effects on responding following confirmation and nonconfirmation of an expectancy of success within a non-reward paradigm.

Four groups of 20 subjects, 10 males and 10 females each, were employed. The groups were: (1) high in need achievement and low in failure avoidance, (2) high in both need achievement and failure avoidance, (3) low in need achievement and high in failure avoidance and (4) low in both motives. The motive to achieve was measured using the need achievement scale of the Personality Research Form (Jackson, 1966), and the motive to avoid failure was assessed by the test Anxiety Questionnaire (Sarason & Ganzer, 1962). The factorial design was employed to collect the data which was analyzed using analysis of variance. The dependent measures were three speeds taken as the reciprocal of three reaction times.

Analysis of the data revealed that: nonconfirmation resulted in an inhibition of motor responding; motive confirmation and expectancy interacted and produced differential effects; the effects of nonconfirma-

tion persisted longer for males than for females; anxiety was facilitative for subjects high in both need to achieve success and to avoid failure (provided the task was perceived as difficult), and subjects high in achievement motivation were prepared to persist longer at a task than subjects low in achievement motivation.

It was concluded that the integration of Amsel's (1958) theory and Feather's (1963) model remains for further research. The model of motive x expectancy x incentives was considered to be most applicable to the majority of the data. The results provided some support for the general theory of frustrative nonreward (Amsel, 1958) and also indicated the importance of personality variables.

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INTRODUCTION

The influence of anticipated future events on ongoing behaviour remains a crucial issue in psychology. In considering this phenomenon, Hull (1930) (cited by Atkinson, 1964, p. 150) pointed to the importance of response-produced stimuli. Such stimuli could account for foresight or what Tolman (1932) has called cognitive expectation (the knowledge of what leads to what). Hull speculated that response-produced stimuli could elicit the conditioned or goal response. Recognizing that extinction would occur if the entire goal response was elicited in the absence of reinforcement, Hull reasoned that only a segment of the conditioned response could occur if performance was to be maintained. The partial elicitation of a goal response by response-produced stimuli or internal drive stimuli was called the fractional anticipatory goal response (r_g). "This fractional anticipatory goal response (r_g) could occur and should occur as a response to the internal drive stimulus (S_d) at the very beginning of and throughout a behaviour sequence." (Atkinson, 1964, p. 153)

The concept of fractional anticipatory goal response, thus, served as a recognition of expectancy as postulated by Tolman (1932), and drew attention to an important determinant of molar action. Although Hull (1943) minimized the role of r_g he had to reconsider the concept in his

later work, so as to more fully understand and explain behaviour. The significance of this concept for the analysis of behaviour has been demonstrated by more recent research and theory involving r_g and its accompanying stimuli (s_g) and it is now accepted as a key concept (Amsel, 1958, 1962; Kimble, 1961; Spence, 1956, 1960).

The concepts of cognitive expectation and of r_g, although postulated to explain similar behavioural phenomena have led to two separate programmes of research, typified on the one hand by the cognitive theorists and on the other hand by the stimulus response (S-R) or reinforcement theorists. Within the S-R framework, researchers have employed $r_g - s_g$ to account for a number of phenomena among which are

> "...latent learning, frustration, place learning, delay of reinforcement, problem solving and conflict behaviour. In each of these cases the fractional anticipatory goal response has been made to serve much the same function as the idea of expectancy does in cognitive theories..." (Kimble, 1961, p. 53).

Many investigators studying the parameters of reinforcement have interpreted value reward as having a motivational function as well as a reinforcement value. These studies (reviewed by Kimble, 1961) have shown that changes in quantity and/or quality of reinforcements produced changes in performance. These changes in performance are considered to be the result of changes in incentive motivation.

If rewards possess a motivational function, the problem then is to explain how the effects of reinforcement can act as a motive in a situation remote from the goal complex. It becomes obvious that since the primary reinforcement would be absent in remote situations, the r_g must possess motivational properties. "...we have assumed that this $r_g - s_g$ mechanism also has motivational properties that vary with the

magnitude or vigor with which it occurs..." (Spence, 1956, p. 135). Spence further assumed that the motivational qualities of $r_g - s_g$ add to the overall drive state of the organism to produce an increased drive. Thus, in a situation where the $r_g - s_g$ sequence is conditioned to a positive (rewarding) state of affairs there should be increased motivation to approach the goal, and a decreased motivation to approach when the state of affairs is negative (nonrewarding or punishment).

The general findings, in partial reinforcement studies, of higher asymptotic performance during acquisition and greater resistance to extinction appears to contradict the above conclusion. An important theoretical contribution bearing on this problem has been made by Amsel (1958). Amsel postulates that when there has been an expectation of reward, its omission will generate frustration. It is assumed that frustration and its accompanying stimuli become conditioned to the approach response, and since frustration possesses motivational properties, it adds to the general drive state to produce faster responding. According to Kimble (1961), the first clear demonstration of the energizing (motivational) function of frustration was by Amsel and Roussel (1952).

The theory of frustrative nonreward (Amsel, 1958, 1962) assumes a positive relationship between the strength of the anticipatory reward response (r_r) and frustration (R_F). Given the establishment of r_r, frustration is defined as a primary, aversive motivational condition resulting from nonreward. The theory states that after a number of rewarded trials and the development of a consumatory response (R_r), stimulus cues in the situation become classically conditioned to R_r and begin to elicit fractional components of the consumatory or goal response (r_r) before reward is delivered. Response-produced stimulation (s_r)

associated with r_r becomes a part of the stimulus complex conditioned to the approach response. Following the development of $r_r - s_r$ (expectation for reward) nonreward will result in an aversive emotional state (R_F or frustration), which has drive properties.

Anticipatory frustration (r_f) develops in the same manner as r_r and is accompanied by its own response-produced cues (s_f). During the initial training trials antedating goal responses (r_r and r_f) are in conflict since s_r is conditioned to approach and s_f would elicit avoidance or inhibiting tendencies. A consequence of this conflict is increased variability and/or a decrease in response speed (approach). If the conflict is resolved by running to the goal box the response-produced cues from s_f become associated with the approach response. Once s_f is conditioned to the approach response, the added drive from r_f would result in an increase in response speed (the frustration effect) and a greater resistance to extinction.

The effects of frustration as described by Amsel (1958) have been carefully studied and have demonstrated an increased vigor of response; increased running speeds in rats (Amsel, 1962; Amsel & Hancock, 1957; Wagner, 1963); greater resistance to extinction (Amsel & Ward, 1965); increased speed of lever pulling in children (Bruning, 1964; Moffitt & Ryan, 1965; Pederson, 1965, 1966; Penney, 1960; Ryan, 1965); and increased variability of response in female college students (Boroczi & Nakamura, 1960).

The work of Endsley (1966) has, however, failed to confirm these findings. He reported faster speeds following success (reward) than following failure (nonreward). Endsley, however, employed a procedure

modeled after a level of aspiration task, varying both distance from the goal at which failure occurred and the effort required to perform the task. Direct comparisons are, therefore, difficult and his failure to confirm other findings remain tenuous. The task was presented to elementary school Ss as one of balancing skill, balancing a ball on a 'Ball Tower'. Subjects could obtain another ball following 'success' or 'failure' by pressing a plunger. Measures were taken of force and speed of plunger depression. By using this procedure Endsley introduced into non-reward studies the element of skill, which until then had not been investigated. Studies of level of aspiration for the most part fall within the framework of cognitive theory employing expectancies and motives (individual differences) as interpretative concepts. By employing this technique, Endsley's investigation raises some serious difficulties for the frustrative non-reward theory when it is applied to human Ss. The paucity of comparative data prevents one from making reasonable extensions of the frustrative non-reward theory, to better explain the behaviour of human Ss. Given the relative complexity of the human organism, one way of expanding the theory is to do a study combining cognitive variables and the frustrative non-reward paradigm. Two cognitive variables which might be fruitfully employed are expectancies and motives.

Individual differences, in terms of levels of expectancy, have been introduced in some studies as "post hoc" explanations, in order to fit their data into the frustrative non-reward theory. Cromwell (1963) and Stevenson and Zigler (1958) advanced the notion that mental retardates may approach tasks with a low expectancy for success due to their history of past failures. Moffitt (1965) also utilized low success expectancy to account for the absence of the frustration effect in retardates, and

suggested that retardates were less frustrated following nonreward than normals. Based on the finding that early in acquisition partially reinforced subjects responded more quickly than did Ss receiving 100% reinforcement, Ryan (1965) suggested that expectancy of reward may have been established by instructional sets, and therefore, the effects of nonreward would be evident very early in training when humans were employed as subjects. His suggestion that an expectation can be established by instructions alone points to the importance of conceptualization in humans. Further support for the inclusion of individual differences in the nonreward model, especially when humans are used as Ss, is given by Bailer and Cromwell (1965). In their study, 32 retardates were separated into 18 'failure avoiders' and 14 'success strivers' on the basis of whether they would rather repeat a failed or mastered task. It was found that following failure on a card sorting task the 'success strivers' showed greater increase in performance than 'failure avoiders'.

Feather's (1963a) alternative conceptualization of Mowrer's (1960) concepts of fear, hope, relief and disappointment seems to be readily reconcilable with the frustrative non-reward theory. Feather's concept of motivational disappointment, in particular, appears to serve the same function in achievement motivation studies as that served by frustrative nonreward in reinforcement studies. His model also provides for the consideration of individual differences and their influence on behaviour following frustrative nonreward.

Unlike Mowrer (1960), Feather (1963a) considers hope motivation and fear motivation as theoretical concepts, which are expected to correlate positively with measures of the emotional responses of hope and fear. Feather's conceptualization further differs from Mowrer's

in that the concepts are not defined as different aspects of the fear response.

> "...Hope motivation is not anticipated fear reduction, nor is motivational disappointment considered to be the recrudescence of the emotion of fear. Instead the four concepts are explicated within the framework of a motive-expectancy-value model..." (Feather, 1963a, p. 507).

Expectancy is defined by Feather as a cognition about the consequences of behaviour. Motives are defined as relatively stable personality dispositions which may have innate bases, but are likely to be the product of early learning (Atkinson, 1957; Feather, 1963a). More specifically, motives are postulated as dispositions within the individual to approach certain classes of events or objects and to avoid others. The Ss used by Bailer and Cromwell (1965) and described as 'success strivers' and 'failure avoiders', may be said to have exhibited the motive to achieve success, and to avoid failure, as described by Atkinson and Litwin (1960). Incentives are defined as the value of the consequences of an act (goal, reward) to the individual, and include attributes such as attractiveness (quality or quantity) of the reward. The term 'nonconfirmation of an expectancy' (of success) employed by Feather is similar to nonreward. Feather (1963a) maintains that when nonconfirmation or partial nonconfirmation of an expected reward occurs, the result is 'motivational disappointment', which is mediated by a lowering of 'hope motivation'. 'Hope motivation' is the tendency to approach a reward or positive incentive. It is not equated with the expectation of reward, nor is it considered in terms of fear reduction. Expectation of reward is taken by Feather (1963a) to be a necessary but not a sufficient condition of hope motivation. Hope motivation is assumed to be dependent on the

strength of the relevant motive and the magnitude of the positive incentive. Confirmation of an expectancy of reward results in an increase in the strength of that expectancy and hence an increase in hope motivation. Increases in hope motivation may also occur when there is overconfirmation; that is, where there is an unexpected increase in the quality or quantity of the expected reward. Similarly, 'fear motivation' is conceived of as the tendency to avoid a negative incentive or punishment. Its strength depends on the strength of the expectancy, the intensity and duration of the negative incentive and the strength of the motive to avoid punishment. 'Motivational relief' is occasioned by a reduction in fear motivation, which occurs when there is nonconfirmation of an expectancy of punishment.

The general assumption underlying Feather's (1963) model is that in achievement situations, where expectancy and incentives are related, whenever confirmation or nonconfirmation of an expectancy of success or failure (nonreward) shifts the strength of the expectancy towards the intermediate value (probability of success (P_s) = .50), the corresponding motivation increases. When the shift is away from the intermediate value (P_s = .20 or .80), the corresponding motivation decreases.

The model having evolved from Atkinson's (1957) theory of achievement motivation states that in achievement situations, 'hope for success' motivation is taken as the multiplicative combination of motive to achieve success (M_s), expectation of success (P_s) and positive incentive value (I_s). Similarly 'fear of failure' is the multiplicative combination of motive to avoid failure (M_f), expectation of failure (P_f), and the negative incentive value of failure (I_f). The positive incentive value of success is taken as the complement of the subjective

probability of success ($I_s = 1 - P_s$) (Atkinson, 1957; Feather, 1963). The same relationship exists between the probability of failure and negative incentive value, but with a minus sign: $I_f = -(1 - P_f)$. It is postulated that the relationship between hope for success motivation and subjective probability of success is a curvilinear one increasing to a maximum value as P_s increases to .50 and thereafter decreasing in value as P_s further increases. The same relationship holds for fear of failure motivation. The occurrence of motivational disappointment or relief will depend on the strength of the corresponding expectation. (Frustration similarly depends on the strength of the expectancy of reward.) Motivational disappointment occurs following failure at a task considered to be difficult (i.e., a weak expectation of success), and relief occurs following failure at an easy task because of the curvilinear relationship. If a strong expectancy of success or failure ($P_s >$ .50; $P_f >$ .50) were not confirmed, the theory states that this condition would result in increases in the appropriate motivation rather than disappointment or relief.

TABLE I

Relationship between Nonconfirmation and Motivational Consequences in Achievement Tasks

Task Difficulty (Probability of Success or Failure)	Nonconfirmation	Result
P_s = 90 (easy)	failure	increased 'hope'
P_f = 90 (difficult)	success	increased 'fear'
P_s = 10 (difficult)	failure	'disappointment'
P_f = 10 (easy)	success	'relief'

When the expectation is one of failure, success is viewed as nonconfirmation. Similarly if the expectation is of success, then failure is the nonconfirmation.

Studies investigating success and failure and expectancies have yielded results showing differential effects due to motives. The motives commonly employed[1] are motive to achieve success M_s (need achievement) and motive to avoid failure M_{af} (test anxiety) (after Atkinson & Litwin, 1960). It has been shown that Ss high in need achievement (n Ach.) motivation learned a paried associate task faster than Ss low in n Ach. motivation when the task was perceived as difficult (Weiner, 1966). Weiner (1965a) also found that Ss in whom n Ach. was greater than test anxiety persisted longer and worked faster following failure at a difficult task than when they were successful. Subjects low in n Ach. but high in anxiety persisted longer and worked faster following continual success than following failure. The finding of faster responding and greater persistence in the difficult task by Ss with greater n Ach. than test anxiety could also be predicted from Amsel's (1958) theory. Amsel's theory, however, would not have predicted differential performance based on motives or situational differences (e.g. difficulty of the task). These findings suggest that different results may be expected from human Ss, depending on their personality and the situation in which they perform. Feather (1963b) also demonstrated a positive relationship between persistence at a difficult task for Ss high in n Ach. He further con-

[1]The motive to achieve success (M_s) is most often measured by projective tests (TAT stories or test of insight, French, 1958). Motive to avoid failure (M_{af}) is most frequently measured by Mandler and Sarason (1952) test anxiety questionnaire.

cluded that there was a general tendency for Ss to persist longer at a task when their estimated probabilities of success were high. This relationship between estimated probabilities (expectation of success) and persistence was found for Ss high in n Ach. and low in test anxiety. Other investigators in the area have also demonstrated similar effects resulting from differing motives and expectancy, and have pointed to the importance of considering individual differences and situational variables in the performance of human Ss. For example, Weiner (1965b) has shown that Ss high in n Ach., low in test anxiety, tended to spontaneously resume an interrupted task following an interpolated activity in which they failed, whereas Ss low in n Ach. more often resumed after a success. Feather (1966) showed that initial failure resulted in a lower mean performance of subjects. He also demonstrated (1965) that Ss high in n Ach. obtained a higher score on moderately difficult anagram tasks than on those incorporating easy anagrams, but Ss with high test anxiety obtained scores for the easy anagrams.

The similarity between the concept of motivational disappointment and frustration is obvious. They are both thought to have motivational properties and result initially, at least, in response inhibition. Frustration is defined as aversive. Disappointment is defined as a reduction in approach tendency, i.e., a lowering of hope motivation. Both concepts are also assumed to be occasioned by the nonconfirmation of an expectancy of reward. The strength of both depends on the strength of the relevant motive and the magnitude of the positive incentive value. They differ, in that motivational disappointment occurs only with nonconfirmation of a weak expectancy of success. Frustration is assumed to occur regardless

of the difficulty of the task. Unlike frustration, the concept of motivational disappointment was not developed to explain motor responding per se, and Feather (1966) has yet to extend it to include such behaviours. If the two model (Feather, 1963a; & Amsel, 1958) could be integrated, at least in part, it would assist in exploring the antecedents affecting the responses of human Ss to failure or nonreward.

Statement of the Problem

This study is an attempt to integrate Amsel's (1958) theory of frustrative nonreward and Feather' s (1963a) alternative formulation of Mowrer's (1960) concepts of hope, fear, relief, and disappointment. Specifically the attempt is to integrate motivational disappointment and frustration. The investigation will attempt to determine whether personality variables (n Ach. & test anxiety) have predictable effects on responding following confirmation and nonconfirmation of an expectancy of success.

It is also of importance to determine whether the frustrative effect can be demonstrated using a reward suchas the 'satisfaction' of being correct at a task, and to determine whether response inhibition is associated with motivational disappointment. Performance will be examined in relation to perceived task difficulty.

Design

A 2 x 2 x 2 x 2 factorial design with repeated measures will be used. The independent variables will be: level of expectancy of success, high and low, accomplished by instructional sets; motive to achieve success, measured by n Ach. Scale from the Personality Research Form A (Jackson, 1966); motive to avoid failure, measured by the Test Anxiety Questionnaire (Sarason & Ganzer, 1962); and confirmation of expectancy

defined as perceived success or failure at a task. The dependent variables will be the reciprocals of three reaction time measures. They are start speed (SS = 1/Lift RT); Movement one speeds ($M_1S = 1/M_1RT$) and Movement two speeds ($M_2S = 1/M_2RT$).

Hypotheses

On the basis of the finding that: (a) speed is reduced in approaching a goal box when nonreward has been experienced in the goal box (Amsel, 1958), and (b) responding is inhibited following failure (Ford, 1963; Endsley, 1966), and on the implication of motivational disappointment (Feather, 1963), the following two predictions are made.

(1) SS (Start Speed) and Movement one Speed (M_1S) will be slower following nonconfirmation than following confirmation.

(2) Movement two Speeds (M_2S) will be faster than M_1S following nonconfirmation (failure) than following confirmation (success).

Assuming, on the basis of Feather's model and the research cited above, that in an achievement situation Ss high in n Ach. will tend to approach the task with general expectancies of success, and Ss high in test anxiety will approach the tasks in such a way as to avoid failure (i.e., they would be failure oriented), the following additional predictions are made.

(3) In a condition having a high expectancy of success (low expectancy of failure) Ss with high test anxiety and low n Ach. will have faster SS and M_1S following success than following failure. Success for these Ss would be a nonconfirmation of a weak expectation of failure and, thus, result in 'motivational relief'. For these Ss, failure (nonreward) will result in slower speeds (i.e., confirmation of an expectancy

of failure results in slower speeds due to increase in fear hence avoidance tendencies).

(4) In the condition of low expectancy for success (strong expectancy of failure), Ss with high test anxiety and low n Ach. will have slower SS and M_1S following success (i.e., nonconfirmation of expectancy) than following failure due to increases in fear of failure motivation and increase in avoidance tendencies.

(5) Subjects in whom n Ach. is greater than test anxiety will have faster SS and M_1S following failure than success in the easy condition (high expectancy of success). This increase would be due to increases in hope motivation.

(6) In the difficult condition (low expectancy of success), Ss with higher n Ach. than test anxiety will respond faster following success. Therefore, start speeds and M_1S will be slower following failure due to the reduction of hope motivation (motivational disappointment), which is defined as, reduced tendency to approach.

(7) It is further predicted that Ss with high n Ach. and low test anxiety will be prepared to persist longer at a difficult task than Ss with high test anxiety and low n Ach., or those in whom the two motivations are approximately equal.

METHOD

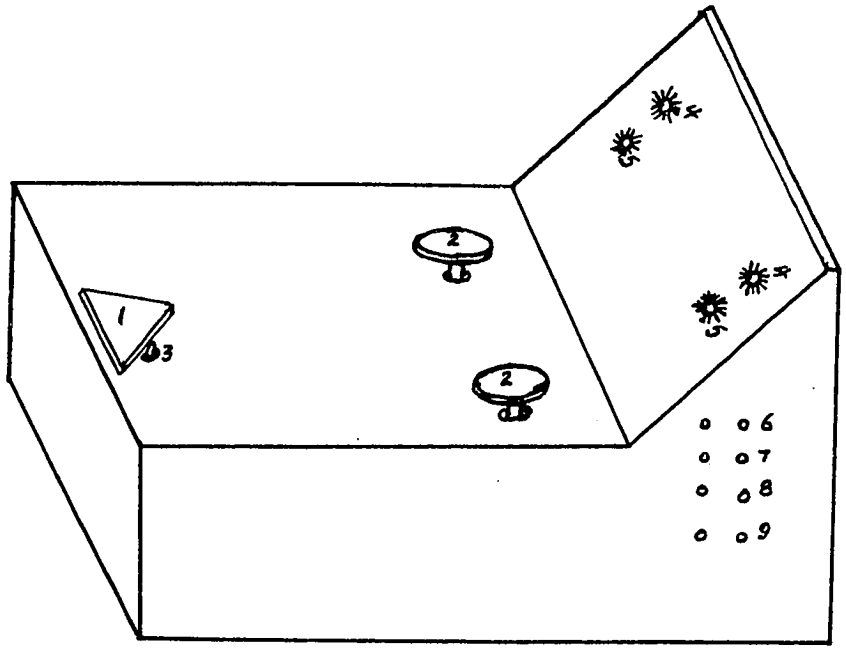
Subjects

Four groups of 20 Ss, 10 males and 10 females each, were selected from 297 introductory psychology students on the basis of their test scores. The tests employed were the n Ach. scale of the Personality Research Form (Jackson, 1966) and the Test Anxiety Questionnaire (Sarason & Ganzer, 1962). The Ss were tested approximately six weeks before the main experiment began. A S was designated high on the scale if his score fell in the top one third of all scores for that test, and low if his score fell in the bottom third of the distribution. The four groups were: (1) Ss high in n Ach. and low in test anxiety (M_s M_{af}), (2) high n ach., high test anxiety ($M_s = M_{af}$ High), (3) low n Ach., high test anxiety (M_{af} M_s) and (4) low n Ach., low test anxiety ($M_s = M_{af}$ Low). One S failed to understand the instructions after 20 practice trials and was replaced.

Apparatus

The apparatus used was a modification of that described by Malmo and Crisp (1945). (See Fig. 1). The dimensions were 24" x 18" x 6"

The degree of overlap between the two scales was assessed using a Pearson product-moment correlation. A correlation of .049 was obtained indicating that the two scales were independent.



1 Handrest
2 Plungers
3 M/SW
4 Demonstration Lights
5 Experimental Lights
6 - 8 Plugs for Stop Clocks
9 Plugs for Power Source (6 V DC)

Figure 1. Schematization of Apparatus (not drawn to scale)

with a display panel 18" x 12" sloped at a 45° angle directly in front of the Ss.

On the display panel two sets of two signal lights were mounted. Each set had one red light and one white light. The lights on the top set were 8" apart and were used for demonstration, the bottom set was mounted 3" below and was used for presentation of experimental stimuli.

On the base of the box, in line with the lights and 12" apart, were two plungers, each controlling a microswitch (M/S). The plungers were normally up and could be depressed by the Ss. Immediately in front of the Ss and between the plungers was a handrest also controlling a M/S. The distance between the handrest and each plunger was 12". The basic electrical circuit described by Malmo and Crisp (1945) was modified to include the handrest, plungers, experimental lights and three .01 second standard 6-Volt DC stop clocks. Illuminating any one of the experimental signal lights activated two of the three stop clocks. Lifting the hand from the handrest stopped one clock to measure lift reaction time (LRT), and pressing the plunger directly below the illuminated light stopped the other clock to measure movement one reaction time (M_1RT). The third clock was activated when the second experimental light was illuminated. Pressing the plunger directly below that light stopped the slock to measure movement two reaction time (M_2RT). The clock measuring LRT operated only when the handrest was depressed closing that part of the circuit. The entire apparatus was painted flat black, except for the handrest and the plungers, which were painted white.

Procedure

The Ss, tested individually, were randomly assigned to either a

high or low expectancy of success condition in such a way that every group had 50% of its Ss in each condition. The following instructions were read to the Ss in the high expectancy condition (Hi Expect.).

> "This experiment is concerned with the effect of mental activity on motor responding. Consequently there are two tasks to be done simultaneously. The first task involves solving a sequence of lights. You will be given a part of the sequence on the top two lights (demonstration lights), and on the basis of what you see you are to predict the colour of the next light in the sequence, i.e., red or white; or left or right, whichever you prefer. For example, the sequence may simply be red, white, red, white. If the last light in the demonstration is the red one, in this sequence you would expect the white one to come on next. The initial sequences are fairly simple, but later sequences become more complicated. They are not difficult, and you should have no difficulty solving them; most Grade 10 students in a pilot study had no difficulty with them at all.
>
> When the demonstration is ended you will tell me verbally, which light you predict will come on . The correct light in the sequence will come on, in the bottom set of lights (experimental lights). The onset of the bottom light, besides telling you if you were right or wrong in your prediction, also tells you which of these two plungers you are to push. Now we come to the second task. This is a handrest (show Ss) under it is a switch. If you press down on it you will note that it give a bit. You are closing a switch, I would like you to keep it pressed down during the experiment when your hand is on it. It does take a great deal of pressure -- just a little more than the weight of your hand. Under these plungers are also switches to put out the light. Now, whenever one of these two lights come on (experimental lights) you are to lift your hand from the handrest and press the plunger whether you have been right or wrong in your prediction. After the light goes out, you are to keep your hand on the plunger until the other light comes on. When the other light comes on you are to take your hand from the plunger and press the other plunger below that light, and then return it to the handrest when the light goes out. Since we are concerned with motor responding you are to move as quickly as you can in all cases.
>
> Now then, first there is a demonstration of a sequence, you predict, i.e. tell me which light will come on next. The correct light on the bottom set comes on. At that time you quickly lift your hand from the handrest and press the plunger directly below that light and keep it there. When the second light comes on, as it will always do, you quickly

move over and press that plunger, then return to the handrest. Remember you keep the handrest pressed down when your hand is on it. Any questions?"

Subjects in the low expectancy of success condition (Lo Expect.) were given the same instruction, except where it related to the difficulty of the task. They were told:

"The sequences become more complicated and difficult as we go on. In fact they become quite difficult, as a number of our graduate students, in a previous study, could not solve them."

Once the Ss had made their predictions orally, the experimenter (E) then confirmed or disconfirmed their expectations. Each S was given 20 practice trials. These trials consisted of predictable sequences, and the S's predictions were confirmed at least 90% of the time. (Sometimes a S failed to solve a sequence and he was not confirmed. This lent credibility to the sequences themselves). The 20 practice trials assured that each S understood the instructions, and was responding consistently.

Following the 20 practice trials, 20 experimental trials involving random sequences were presented in which Ss predictions were confirmed 40% of the time. No S received confirmation on more than two consecutive trials. At least 60% of the sequences in the experimental trials were random; those that were not were confirmed if correctly predicted. The intertrial interval (time between offset of the second experimental light signalling end of trial and the onset of the first demonstration light for beginning of trial) was 15 sec. In order to reduce anticipation of the onset of the experimental lights and to eliminate moving before the lights were illuminated, the time of onset of the experimental lights varied from 1 - 10 sec. after the end of the

demonstrations. After pressing the first plunger, Ss were required to keep their hands on that plunger for approximately 3 seconds (range 1 - 5 seconds).

At the end of the experimental trials each S was asked to make a choice. He could stop, or go on trying to solve the sequences. If he chose to go on, he was asked how long he was prepared to do so, and to indicate which of three types of sequences he would prefer, an easier one, one of equal difficulty or one of greater difficulty. If the S chose to discontinue, he was asked which of the three levels of difficulty he would choose if he were asked to do the task again. In either case the experiment was terminated at this point.[3]

At the end of the testing period each S completed two questionnaires (see Appendices A & B). One was a questionnaire of eight items, designed to determine whether the S thought the tasks were believable and to evaluate the S's degree of involvement in the task. The other was a personal history questionnaire of nineteen items, included as to ascertain if there were significant differences in the personal histories among the four groups.

[3]This statement of intended persistence was suggested from the results of a pilot study, in which some Ss persisted for a further 60 minutes. Considering the information actual testing would yield the added experimental cost in time appeared to be impractical.

RESULTS

Analysis of Data

The data were analyzed using a 2 x 2 x 2 x 2 factorial design with repeated measures. The variables were need achievement (Hi & Lo), test anxiety (Hi & Lo), expectancy (Hi & Lo), and confirmation/nonconfirmation (C/NC). Three such analyses of variance were carried out, one for each of the three speeds of responding defined as the reciprocal of the three RT measures: LRT, M_1RT, and M_2RT.

These data were also reanalyzed, using the same paradigm, for males and females separately. An Analysis of Variance, two-way classification (Ferguson, 1959) was used to analyze the data from intended persistence. For this and subsequent analyses the subjects were classified into the four original groups, based on their scores on the n Ach. and test anxiety scales. The χ^2 technique was employed to analyze the data from task preference, and the questionnaires.

Main Analysis - Hypotheses 1 and 2

The summaries of the analyses of variance for Start Speed (SS), Movement one Speed (M_1S) and Movement two Speed (M_2S) are presented in tables, II, III, and IV, respectively. A significant main effect for the confirmation variable was obtained for all three speeds. Speeds following C trials were faster than those following NC trials (SS, F = 140.29,

TABLE II

Summary of Analysis of Variance of Start Speeds

Source	MS	DF	F	
A = Anx.	0.0007	1	0.001	
C = N. Ach.	1.1804	1	1.602	
D = Expect.	0.1025	1	0.139	
AC	0.0198	1	0.027	
AD	2.5548	1	3.468	
CD	0.7835	1	1.064	
ACD	1.8538	1	2.516	
S'SW	0.7367	72		
B = C/NC	12.2993	1	140.288	***
AB	0.0184	1	0.210	
BC	0.1098	1	1.252	
BD	0.0088	1	0.101	
ABC	0.0161	1	0.183	
ABD	0.3102	1	3.538	
BCD	0.0145	1	0.166	
ABCD	0.6652	1	7.587	**
BxS'S	0.0877	72		
		159		

** P<.01
*** P<.001

TABLE III

Summary of Analysis of Variance for M_1 Speeds

Source	MS	DF	F	
A = Anx.	0.0050	1	0.026	
C = N. Ach.	0.2841	1	1.457	
D = Expect.	0.0107	1	0.055	
AC	0.0014	1	0.007	
AD	0.4905	1	2.515	
CD	0.4119	1	2.113	
ACD	0.2133	1	1.094	
S'SW	0.1950	72		
B = C/NC	1.8192	1	154.606	***
AB	0.0104	1	0.886	
BC	0.0000	1	0.002	
BD	0.0027	1	0.234	
ABC	0.0001	1	0.012	
ABD	0.0104	1	0.882	
BCD	0.0039	1	0.335	
ABCD	0.0125	1	1.059	
BxS'S	0.0117	72		

*** P<.001

TABLE IV

Summary of Analysis of Variance for M_2 Speeds

Source	MS	DF	F	
A = Anx.	0.0037	1	0.355	
C = Ach.	0.3518	1	1.099	
D = Expect.	0.1528	1	0.477	
AC	0.2158	1	0.674	
AD	0.2557	1	0.799	
CD	0.0545	1	0.170	
ACD	0.4350	1	1.359	
S'SW	0.3201	72		
B = C/NC	0.1977	1	10.950	***
AB	0.0023	1	0.128	
BC	0.0394	1	2.185	
BD	0.0002	1	0.009	
ABC	0.0008	1	0.045	
ABD	0.0090	1	0.496	
ACD	0.0007	1	0.037	
ABCD	0.0622	1	3.443	
BxS'S	0.0181	72		

*** P<.001

P<.001; M_1S, F = 1.54.61, P<.0001; M_2S, F = 10.95 P<.001). A significant four-way interaction of n Ach. x Anx. x Expect. x C/NC was also obtained for SS (F = 7.59 P<.01).

The finding of faster speeds on C trials supports hypothesis 1, which stated that SS and M_1S would be slower following NC than following C. A significant difference between M_2S and M_1S was observed following both C and NC. M_2S was found to be faster than M_1S ($\underline{t}$ = 15.8, P<.001 for C, and $\underline{t}$ = 14.21 P<.001 for NC). Hypothesis 2 which predicted faster M_2S than M_1S following NC was, therefore, not supported.

The four-way interaction is graphically represented in Figure 2. Subjects having Hi n Ach. and Hi Anx. scores had faster SS in the Lo Expect. condition than in the Hi Expect. condition on both C and NC trials (P<.001 for C and NC, Table V). This finding was also observed for M_1S and M_2S. The reverse was observed for $\underline{Ss}$ having Hi n Ach. and Lo Anx. scores. These $\underline{Ss}$ had faster SS in the Hi Expect. condition than in the Lo Expect. condition on both C and NC trials (P<.01 for C; P<.05 for NC, see Table V). Figure 2 illustrates that Lo n Ach. - Hi Anx. $\underline{Ss}$ had faster SS in the Hi Expect. condition than in the Lo Expect. condition on C trials in the Hi Expect. condition than in the Lo Expect. condition (P<.01, Table V).

Furthermore, in the Hi Expect. condition Group I $\underline{Ss}$ (Hi n Ach., Lo Anx.) had faster SS on C trials than did Group 2 $\underline{Ss}$ (Hi n Ach., Hi Anx.) on NC trials ($\underline{t}$ = 21437 P<.02). The difference between Group I $\underline{Sson}$ NC trials and Group 2 $\underline{Ss}$ on C trials was not significant. The opposite was true in the Lo Expect. condition. Group 2 $\underline{Ss}$ had faster SS on C trials than Group I $\underline{Ss}$ on NC trials ($\underline{t}$ = 2.353 P<.05).

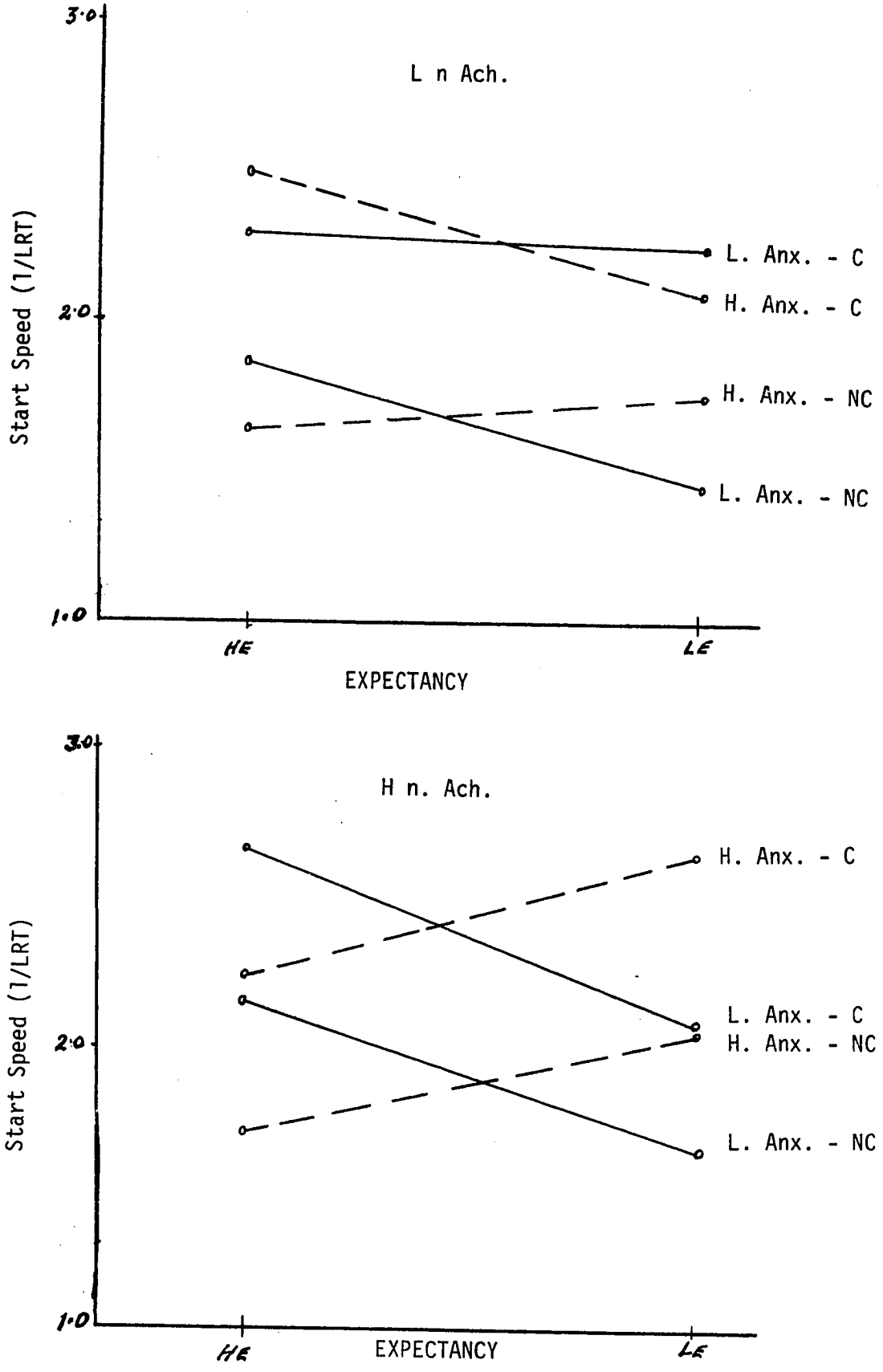


Figure 2. ABCD Interaction on SS for Overall Analysis

TABLE V

Mean SS and t Values for the 4 Groups on C and NC Trials at 2 Levels of Expectancy

		Hi Expect.	Lo Expect.	t	P
Group 1	C	2.625	2.209	3.43	<.01
(H. n Ach.-L. Anx.)	NC	2.044	1.703	2.82	<.05
Group 2	C	2.054	2.656	4.99	<.001
(H. n Ach.-H. Anx.)	NC	1.638	2.151	4.24	<.001
Group 3	C	2.480	2.076	3.35	<.01
(L. n Ach.-H. Anx.)	NC	1.624	1.722	1	NS
Group 4	C	2.278	2.233	1	NS
(L. n Ach.-L. Anx.)	NC	1.852	1.441	3.39	<.01

TABLE VI

Mean SS, M_1S, M_2S and t Values for Groups 1 and 3 on C and NC Trials

Hi Expect. Cond.

		C	NC	t	P
Group 1	SS	2.625	2.044	4.80	<.001
(H. Ach.-L. Anx.)	M_1S	1.244	1.033	3.06	<.001
	M_2S	1.734	1.663	1.0	NS
Group 3	SS	2.480	1.624	7.07	<.0001
(L. Ach.-H. Anx.)	M_1S	1.173	0.939	3.39	<.01
	M_2S	1.509	1.508	1.0	NS

Lo Expect. Cond.

Group 1	SS	2.209	1.703	4.18	<.001
(H. Ach.-L. Anx.)	M_1S	1.162	0.918	3.54	<.01
	M_2S	1.675	1.551	1.48	NS
Group 3	SS	2.076	1.722	2.92	<.01
(L. Ach.-H. Anx.)	M_1S	1.058	0.894	2.37	<.05
	M_2S	1.559	1.459	1.18	NS

Hypotheses 3 - 6

Table VI presents *t*'s of the differences in SS, M_1S and M_2S on C and NC trials in Hi Expect. and Lo Expect. conditions for groups 1 and 3.

Hypothesis 3: The prediction of faster SS and M_1S following C than following NC in the Hi Expect. condition for Ss in whom $M_{af} > M_s$ (Group 3, Lo n Ach., Hi Anx.) was supported (SS, $P>.001$; M_1S, $P>.01$., Table VI).

Hypothesis 4: The prediction that Group 3 Ss would have faster SS and M_1S following NC than C trials in the Lo Expect. condition was not supported. The converse was observed, SS and M_1S was faster following C ($P>.01$, $P>.05$, Table VI).

Hypothesis 5: The consistent finding of faster SS and M_1S following C than following NC in both the Hi Expect. and Lo Expect. condition for Group 3 Ss was also obtained for Group I (Table V). Consequently, this hypothesis, predicting faster SS and M_1S following NC than C in the Hi Expect. condition for Group I Ss ($M_s > M_{af}$, Hi n Ach. - Lo Anx.), was contradicted.

Hypothesis 6: They hypothesis that, in the Lo Expect. condition, $M_s > M_{af}$ Ss would have faster SS and M_1S following C than NC was supported (Table VI).

Hypothesis 7: The summary of the Analysis of Variance for the data on length of time Ss were prepared to persist is presented in Table VII. (The raw data are presented in Appendix G.) The resulting Fs were not significant. Group I mean times were the largest, 55.5 minutes in the Lo Expect. condition and 28.0 minutes in the Hi Expect.

TABLE VII

Summary of Analysis of Variance for Intended Persistence

Source	MS	df	F	P
Raws (Expect.)	3618.05	1	3.62	NS
Col. (groups)	2093.70	3	2.09	NS
Interaction	593.88	3	0.594	NS
Within cells	999.42	72		
Total				

TABLE VIII

Summary of Analysis of Variance for Data on Intended Persistence (Revised with atypical scores omitted)

Source	MS	df	F	P
Raws (Expect.)	777.1	1	4.756	<.05
Col. (groups)	923.2	3	5.649	<.01
Interaction	388.9	3	2.380	NS
Within cells	163.4	56	-----	----

condition.

It was observed that two scores were highly deviant, being more than three standard deviations from the mean. For example, the mean of 55.5 minutes for Group I Ss in the Lo Expect. condition resulted from the inclusion of two extreme scores, 120 minutes and 180 minutes. It appeared of interest, to reanalyze the data excluding these deviant scores. Since these two scores came from the Lo Expect. condition the two highest scores were also omitted from the Hi Expect. condition. The data were, thus, re-analyzed omitting the four largest scores per group, two from the Hi Expect. condition and two from the Lo Expect. condition. Table VIII presents a summary of the results, and Figure 3 gives the graphical representation of the revised analysis.

The analysis of the revised data resulted in significant Fs for both levels of expectancy and groups ($P<.05$; $P<.01$ respectively) with no significant interaction. Separate t tests were employed and the results are presented in Table IX. There was no significant difference for levels of expectancy within groups but there was between groups. In the Hi Expect. condition, Group I Ss were prepared to persist longer than Group 3 Ss ($P<.01$); and Group 2 Ss were also prepared to persist longer than Group 3 ($P<.05$), suggesting that perhaps Ss high in n Ach. were prepared, in general, to persist longer at an easy task than Ss low in n Ach. In the Lo Expect. condition Group I Ss were also prepared to persist longer than Ss of Groups 2, 3 and 4, tentatively supporting hypothesis 7. In this condition it appears that low n Ach. and heightened anxiety affect persistence adversely. There were no significant difference between Groups 2, 3 and 4 in their willingness to persist in this condition.

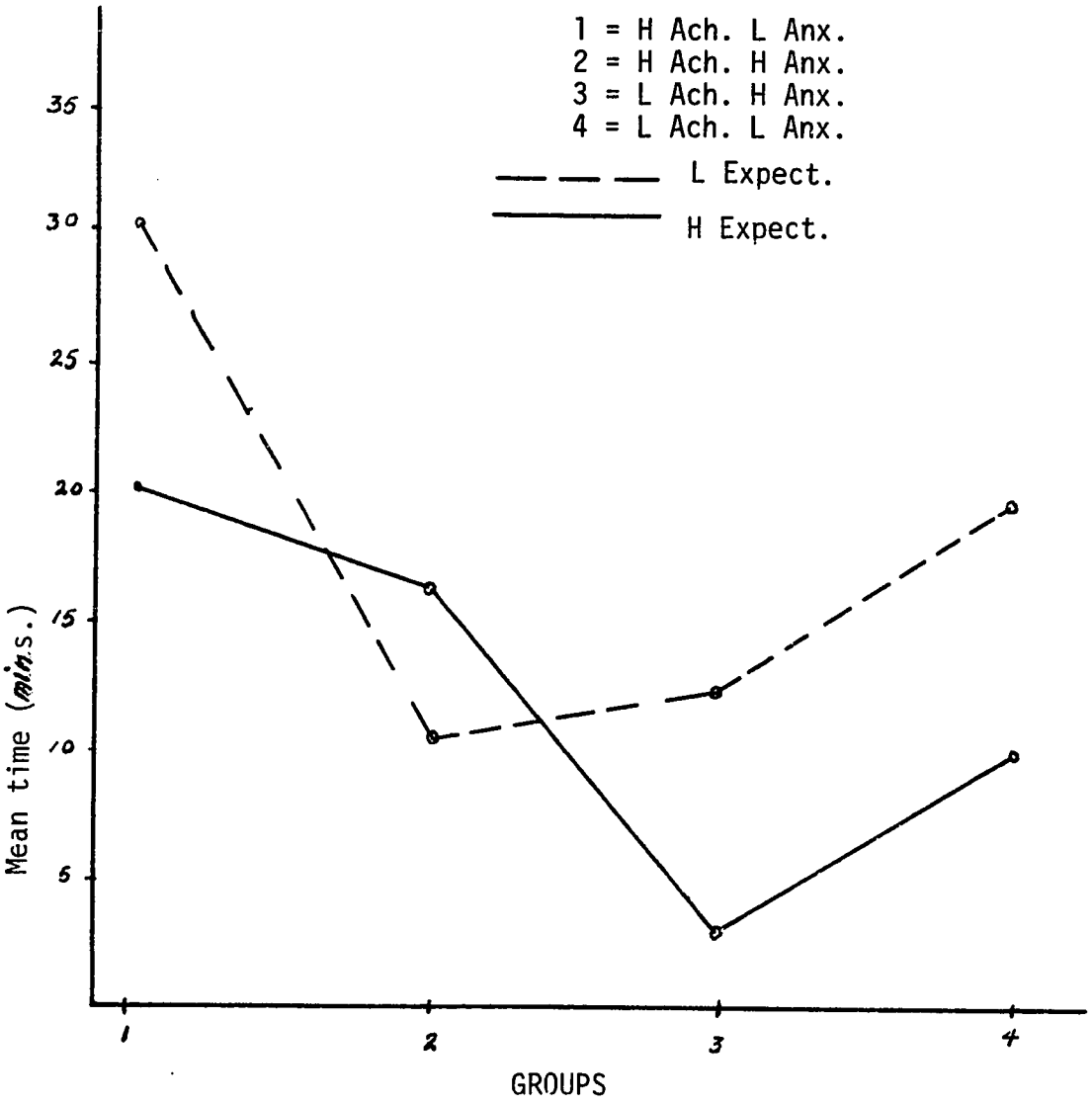


Figure 3. Mean time the different groups are prepared to persist at task (revised)

TABLE IX

Mean times and t Values of Intended Persistence for the 4 Groups at 2 Levels of Expectancy

	Hi Expect.	Lo Expect.	t	P
Group 1	20	31.8	1.847	NS
Group 2	15.6	11.9	1.00	NS
Group 3	2.4	13.4	1.721	NS
Group 4	9.4	18.1	1.362	NS

** Hi Expect.

Groups	t	P
1 vs 3	2.754	.01
2 vs 3	2.065	.05

Lo Expect.

1 vs 2	3.114	.01
1 vs 3	2.879	.01
1 vs 4	2.144	.05

** Only the significant t's are presented

Analysis for Males

The summary of the Analysis of Variance for males' SS, M_1S and M_2S are presented in Tables X, XI and XII. As in the main Analysis a significant main effect of C/NC was obtained for all three speeds, with those following C faster than those following NC. No four-way interaction was found, but a significant three-way interaction among C/NC, n Ach., and Expect. was obtained for M_2S ($F = 5.085$, $P<.05$, Table XII). This interaction is represented in Fig. 4. It will be observed that NC resulted in a greater increase of response speed in the Lo Expect. condition than in the Hi Expect. condition, for Hi n Ach. Ss. Speed on C trials remained the same for Hi Expect. and Lo Expect. conditions. There was no significant change in response speeds for Lo n Ach. Ss on either C or NC trials at either level of expectancy.

The faster speeds of the Hi n Ach. Ss in the Lo Expect. condition when their expectancy was not confirmed, appears to have played the major role in the three-way interaction. This interpretation is supported by the t tests presented in Table XIII. The speed of response of the Hi n Ach. Ss on NC trials was significantly faster in the Lo Expect. condition than in the Hi Expect. condition ($t = 2.065$ $P<.05$). Further, in the Hi Expect. condition, Hi n Ach. Ss had faster speeds on C trials than on NC trials ($t = 2.887$ $P<.01$). In the Lo Expect. condition the difference in speeds on C/NC trials was not significant.

The significant main effect of C/NC for all three speeds yielded similar support for the predictions indicated in the presentation of the main results.

TABLE X

Summary of Analysis of Variance of SS for Males

Source	MS	df	F	
A = Anx.	0.0960	1	0.090	
C = n Ach.	0.5560	1	0.523	
D = Expect.	0.0537	1	0.050	
AC	0.0254	1	0.024	
AD	1.5763	1	1.481	
CD	0.0494	1	0.046	
ACD	0.7587	1	0.713	
S'SW	1.0644	32	-----	
B = C/NC	4.8858	1	67.145	***
AB	0.0917	1	1.260	
BC	0.0001	1	0.001	
BD	0.0220	1	0.302	
ABC	0.0657	1	0.902	
ABD	0.2196	1	3.017	
BCD	0.0271	1	0.373	
ABCD	0.0609	1	0.837	
BxS'S	0.0728	32	-----	
Total				

TABLE XI

Summary of Analysis of Variance of M_1S for Males

A = Anx.	0.0301	1	0.099	
C = n Ach.	0.2112	1	0.697	
D = Expect.	0.0278	1	0.092	
AC	0.0690	1	0.228	
AD	0.4575	1	1.510	
CD	0.0382	1	0.126	
ACD	0.0349	1	0.115	
S'SW	0.3029	32	-----	
B = C/NC	0.8799	1	133.265	***
AB	0.0148	1	2.243	
BC	0.0082	1	1.236	
BD	0.0043	1	0.653	
ABC	0.0036	1	0.538	
ABD	0.0082	1	1.248	
BCD	0.0001	1	0.021	
ABCD	0.0025	1	0.377	
BxS'S	0.0066	32		
Total		79		

*** P<.001

TABLE XII

Summary of Analysis of Variance of M_2S for Males

Source	MS	df	F	
A = Anx.	0.5952	1	1.398	
C = n Ach.	0.2164	1	0.508	
D = Expect.	0.0362	1	0.085	
AC	0.0014	1	0.003	
AD	0.0951	1	0.224	
CD	0.0110	1	0.026	
ACD	0.6846	1	1.608	
S'SW	0.4256	32	-----	
B = C/NC	0.1585	1	16.422	***
AB	0.0008	1	0.080	
BC	0.0156	1	1.617	
BD	0.0031	1	0.316	
ABC	0.0049	1	0.506	
ABD	0.0219	1	2.264	
BCD	0.0491	1	5.085	*
ABCD	0.0369	1	3.823	
BxS'S	0.0097	32		
Total				

* P<.05

*** P<.001

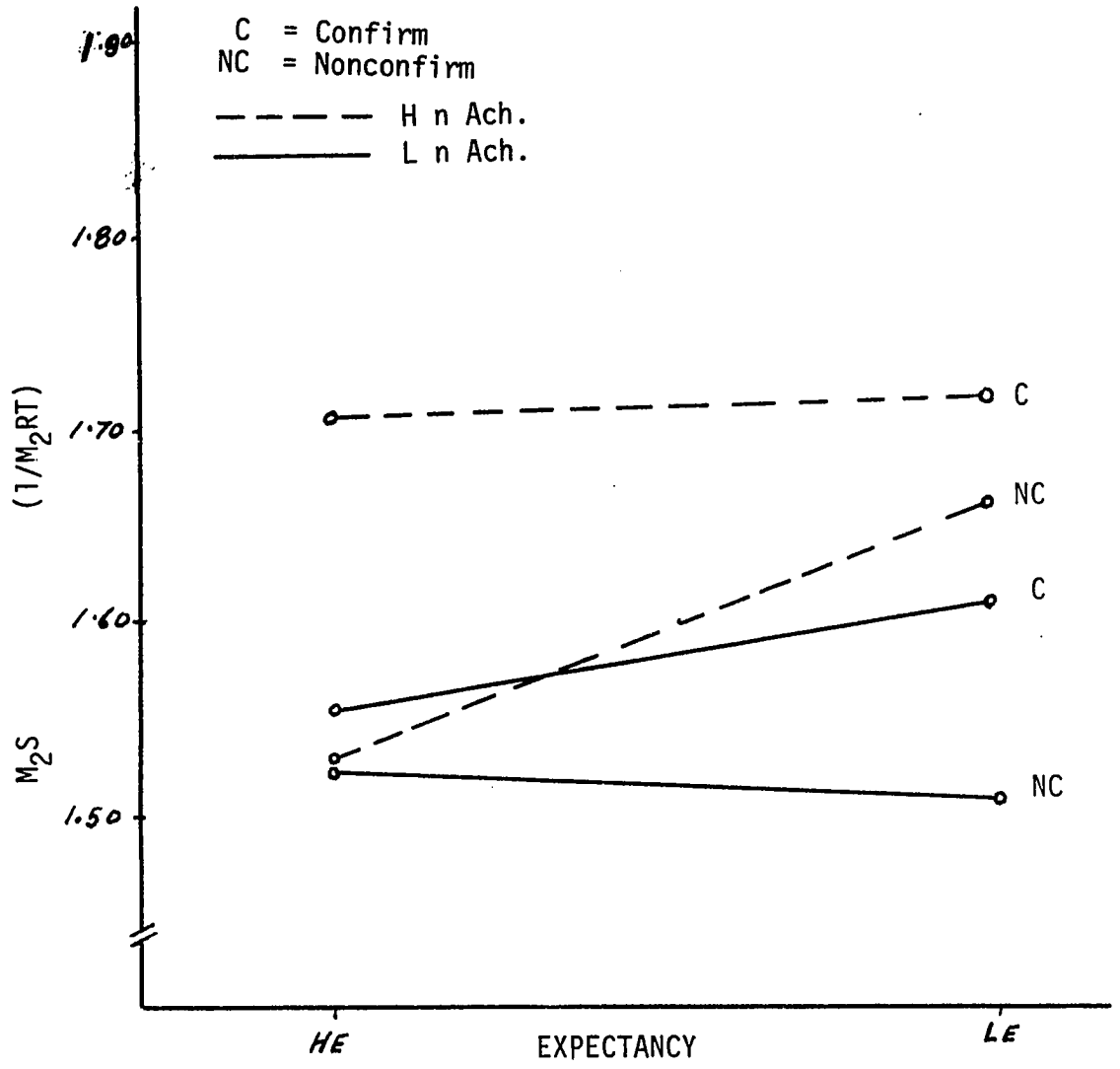


Figure 4. BCD Interaction for Males M_2S

TABLE XIII

Mean M_2S and *t* Values for Hi Ach. and Lo Ach. Male *Ss*

(a)

		Hi Expect.	Lo Expect.	*t*	P
H Ach.	C	1.709	1.713	1.00	NS
	NC	1.530	1.658	2.06	<.05
L Ach.	C	1.551	1.607	1.00	NS
	NC	1.527	1.509	1.00	NS

(b)

		C	NC	*t*	P
H.Ach.	Hi Expect.	1.709	1.530	2.88	<.01
	Lo Expect.	1.713	1.658	1.00	NS
L Ach.	Hi Expect.	1.551	1.527	1.00	NS
	Lo Expect.	1.607	1.509	1.00	NS

Analysis for Females

Tables XIV, XV, and XVI present the summaries of the Analysis of Variance for females' SS, M_1S and M_2S. A significant main effect for C/NC was obtained for SS and M_1S but not for M_2S (SS, $F = 80.6$, $P<.0001$; M_1S, $F = 50.3$, $P<.0001$). As in the main analysis, a significant four-way interaction was found for SS ($P<.01$, Table XIV). This suggests that the four-way interaction obtained in the main analysis was due mainly to the responses of the male Ss, especially since the F ratio for the males' four-way interaction was less than unity.

Figure 5 is a graphical representation of the four-way interaction. The similarity of Figure 5 to Figure 2 (p. 26) is readily apparent. It will be observed that Hi n Ach. Lo Anx. (Group I) Ss have faster SS on C trials in the Hi Expect. condition than in the Lo Expect. condition ($P<.02$, Table XVII). The SS for these Ss on NC trials in the Hi Expect. and Lo Expect. conditions was not significantly different. The converse was true of Hi n Ach. Hi Anx. (Group 2) Ss. These Ss had faster SS on both C and NC trials in the Lo Expect. condition than in the Hi Expect. condition. Subjects having Lo n. Ach. and Hi Anx. (Group 3) scores performed faster in Hi Expect. condition than in the Lo Expect. condition on C trials ($P<.001$, Table XVII). This was opposite to Group 2 Ss who were faster in Lo Expect. condition. Group 4 Ss (Lo n Ach. - Lo Anx.) obtained faster SS on NC trials in the Hi Expect. condition than in the Lo Expect. condition ($P<.02$, Table XVII).

A significant two-way interaction between n Ach. and Expect. was also obtained for M_1S ($F = 4.35$, $P<.05$, Table XV). Figure 6 presents the two-way interaction. It can be noted from this figure, that the rate of change of responding for Lo n Ach. Ss from the Hi Expect. condition

TABLE XIV

Summary of Analysis of Variance for Females' SS

Source	MS	df	F	
A = Anx.	0.1074	1	0.193	
C = n Ach.	0.6249	1	1.120	
D = Expect.	0.4668	1	0.837	
AC	0.1303	1	0.234	
AD	1.0101	1	1.811	
CD	1.0602	1	1.901	
ACD	1.1117	1	1.993	
S'SW	0.5578	32	-----	
B = C/NC	7.5585	1	81.608	***
AB	0.0116	1	0.126	
BC	0.2172	1	2.346	
BD	0.0812	1	0.876	
ABC	0.1873	1	2.023	
ABD	0.1017	1	1.098	
BCD	0.1104	1	1.192	
ABCD	0.8220	1	8.875	**
BxS'S	0.0926	32		
Total		79		

TABLE XV

Summary of Analysis of Variance for Females M_1S

Source	MS	df	F	
A = Anx.	0.0738	1	0.662	
C = n Ach.	0.0865	1	0.776	
D = Expect.	0.0973	1	0.873	
AC	0.1015	1	0.911	
AD	0.0987	1	0.885	
CD	0.5072	1	4.550	*
ACD	0.2174	1	1.950	
S'SW	0.1115	32	-----	
B = C/NC	0.9396	1	50.322	***
AB	0.0005	1	0.028	
BC	0.0117	1	0.628	
BD	0.0001	1	0.004	
ABC	0.0035	1	0.190	
ABD	0.0028	1	0.150	
BCD	0.0060	1	0.320	
ABCD	0.0117	1	0.628	
BxS'S	0.0187	32		
Total		79		

* P<.05
** P<.01
*** P<.0001

TABLE XVI

Summary of Analysis of Variance for Female's M_2S

Source	MS	df	F
A = Anx.	0.0872	1	0.353
C = n Ach.	0.1395	1	0.564
D = Expect.	0.1313	1	0.531
AC	0.3836	1	1.552
AD	0.1656	1	0.670
CD	0.0509	1	0.205
ACD	0.0111	1	0.045
S'SW	0.2472	32	-----
B = C/NC	0.0531	1	2.021
AB	0.0017	1	0.066
BC	0.0244	1	0.930
BD	0.0017	1	0.067
ABC	0.0013	1	0.051
ABD	0.0003	1	0.011
BCD	0.0628	1	2.389
ABCD	0.0259	1	0.985
BxS'S	0.0263	32	
Total		79	

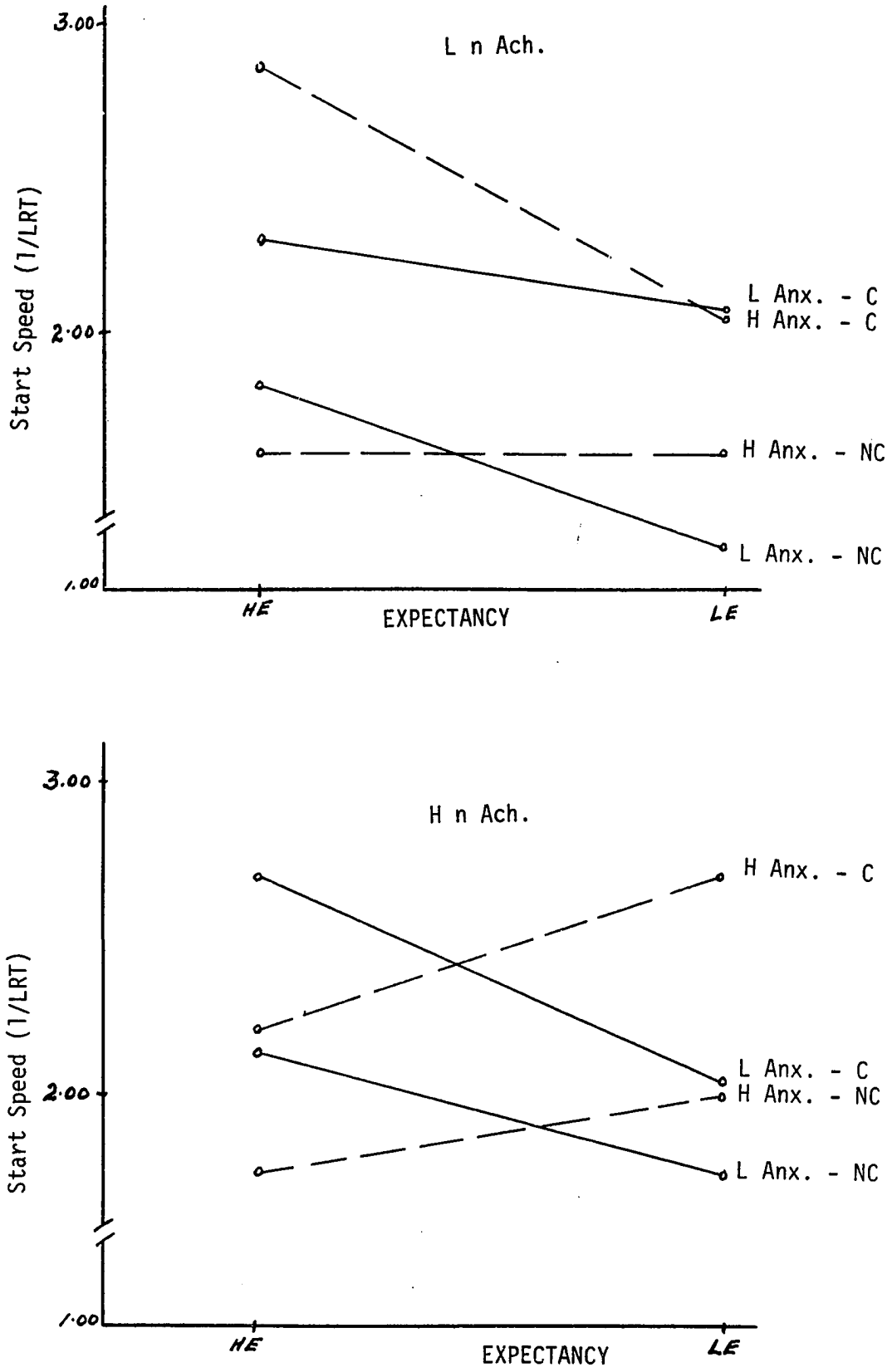


Figure 5. ABCD Interaction on SS for Female Ss

TABLE XVII

Mean SS and *t* Values for the 4 groups of female *Ss* on C and NC Trials at 2 Levels of Expectancy

		Hi Expect.	Lo Expect.	*t*	P
Group 1	C	2.688	2.184	2.61	<.05
	NC	1.984	1.722	1.00	NS
Group 2	C	2.016	2.696	3.52	<.01
	NC	1.720	2.116	2.05	<.05
Group 3	C	2.864	2.058	4.18	<.001
	NC	1.612	1.630	1.00	NS
Group 4	C	2.304	2.068	1.22	NS
	NC	1.842	1.334	2.63	<.05

to the Lo Expect. condition was steeper than that for H n Ach. Ss (t = 2.63, P<.02). A t test revealed that there was no significant change in speed of responding for the Hi n Ach. Ss from Hi Expect. to Lo Expect. conditions. In the Hi Expect. condition there was no difference in response speeds between Lo n Ach. and Hi n Ach. Ss. The difference in the Lo Expect. condition was significant (t = 2.59, P<.02).

The significant main effect of C/NC for SS, M_1S, would indicate similar support for the hypotheses as presented in the main analysis. Data for M_2S did not yield significant results (Table XVI). Analyses were not executed separately for sex on the data dealing with persistence because the combined data did not yield significant results.

SUPPLEMENTARY RESULTS

(a) Data from the personal history questionnaire are presented in Table XVIII, and χ^2 tests indicate that the groups differed on several factors. For one, they were expected to do more tasks by themselves as children; most (95%) Group I Ss reported that independent action was expected of them as children than did Ss of the other groups (χ^2 = 10.26, P<.02). Group I Ss also indicated that they worked hard for an exam because they enjoyed the challenge of the exam. Only 50% of Group 2, and 25% of Groups 3 and 4 said they did (χ^2 = 16.71, P<.001). Groups I and 2 differed from Groups 3 and 4 in that they said they usually did more work at a task than was required. (Group I - 90%; Group 2 - 100%; Group 3 and 4 - 35% each; χ^2 = 32.06, P<.001, Table XVIII). More Group I Ss (85%) indicated that they intended to go on to graduate school, than did Group 2 (55%), or Groups 3 and 4 (25%); (χ^2 = 19.85, P<.001).

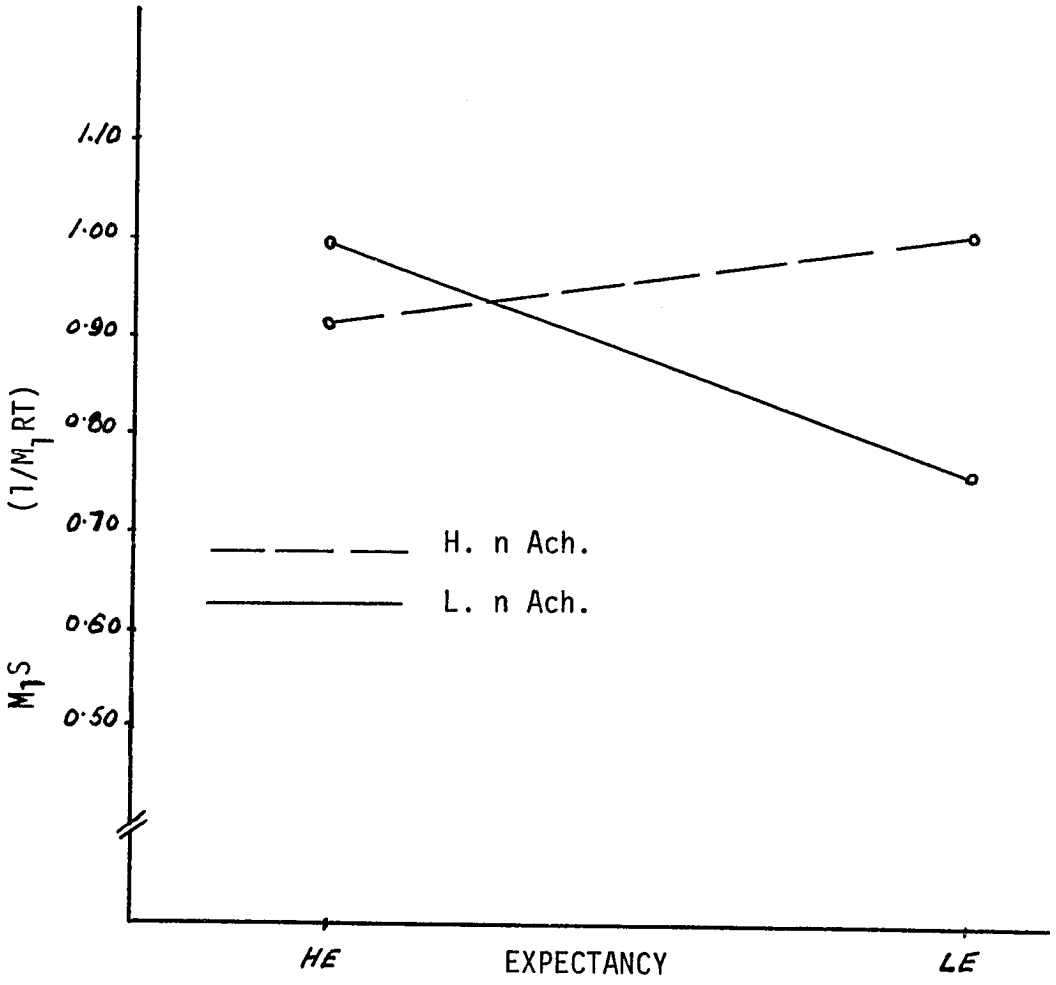


Figure 6. CD Interaction on M_1S for Female Ss

Although the other statements did not yield significant differences between groups, there were obvious significant differences within each group (see, Table XVIII). The majority of Ss indicated that they were infrequently punished, had a closer relationship with mother, and that the family structure was more equalitarian than authoritative.

(b) The χ^2 for the post-experimental questionnaire data are presented in Table XIX. The groups differed in the degree to which they tried to solve the sequences; Groups 1, 2 and 3 differed significantly from Group 4 (Lo n Ach. Lo Anx.) ($\chi^2 = 16.28$, $P<.02$). Group 4 said they did not try too hard to solve the sequence, but Groups 1, 2 and 3 said they tried hard. Only one S in all 80 Ss said he only guessed at the sequences. The experiment also generated some anxiety, as a significant number of Ss indicated that they experienced some anxiety doing the task ($\chi^2 = 13.14$, $P<.05$, see Table XIX). It was also observed that most Ss became more anxious when they were wrong (NC) in their predictions.

(c) There were no significant differences in the preference of tasks (Table XX) among the groups ($\chi^2 = 6.508$, NS). The majority of Ss preferred to choose a task that was the same as just experienced, or intermediate in difficulty, rather than one either easier or more difficult.

TABLE XVIII (to be cont'd)

Chi-Square of the Data from the Personal History Questionnaire
(based on frequency of endorsement of statements)

Statements:	Hi Ach-Lo Anx		Hi Ach-Hi Anx		Lo Ach-Hi Anx		Lo Ach-Lo Anx		χ^2
Equalitarian family	15	(75%)	12	(60%)	13	(65%)	16	(80%)	
vs									2.16
Authoritative family	5		8		6		4		
Closer Rel. to father	6		6		2		7		
vs									4.81
Closer Rel. to mother	10	(62%)	12	(66%)	16	(89%)	10	(59%)	
Punished frequently	2		1		4		1		
vs									<.1
Punished infrequently	18	(90%)	19	(95%)	16	(80%)	19	(95%)	
Expected to do more things by themselves	19	(95%)	12	(60%)	13	(65%)	10	(50%)	
vs									10.26
Not expected to	1		8		7		10		P<.05

TABLE XVIII (cont'd)

Statements:	Hi Ach-Lo Anx		H Ach-Hi Anx		Lo Ach-Hi Anx		Lo Ach-Lo Anx		χ^2
Work hard for marks	2		10		15		16		
vs									
Enjoy challenge of Exam	18	(90%)	10	(50%)	5	(25%)	5	(25%)	16.71
									P<.001
Do more than reqd. at a task	18	(90%)	20	(100%)	7	(35%)	7	(35%)	
vs									
No more	2		0		13		13		32.06
									P<.001
Intend to go to Grad. Sch.	17	(85%)	11	(55%)	5	(25%)	5	(25%)	
vs									
Do not intend to	3		9		15		15		19.85
									P<.001

TABLE XIX

Chi-Square for the Data from the Post Experimental Questionnaire

Statements:	(1) Hi Ach-Lo Anx	(2) Hi Ach-Hi Anx	(3) Lo Ach-Hi Anx	(4) Lo Ach-Lo Anx	χ^2
Very Anxious	4	7	6	0	
Slightly Anxious	8	10	10	16	13.14
Not Anxious	8	3	4	4	P<.05
More anxious when wrong	13	18	15	14	2.54
More anxious when correct	3	8	3	2	NS
Tried hard to solve sequence	13	18	15	8	
Tried not too hard	6	2	5	12	16.28
Only guessed	1	0	0	0	P<.02
Tried harder when correct	1	1	2	0	
Tried harder when wrong	8	5	9	14	10.36
Tried hard regardless	11	14	8	6	NS
Tried to react as fast as possible	11	10	6	11	3.51
Tried not too hard	9	10	14	9	NS

TABLE XX

Chi-Square for Frequency of Task Choice

	Hi Ach-Lo Anx	Hi Ach-Hi Anx	Lo Ach-Hi Anx	Lo Ach-Lo Anx
Groups	(1)	(2)	(3)	(4)
Easier	0	4	5	5
Same	16	14	12	12
More Difficult	4	2	2	3

$\chi^2 = 6.508$ NS

DISCUSSION

The main finding that response latencies following confirmation of expectancy were shorter than those following nonconfirmation confirms the work of Ford (1963) and Endsley (1966). The results, therefore, give tentative support to the hypothesis that nonconfirmation of a positive expectancy is aversive and results in response inhibition. The longer response latencies observed following nonconfirmation is also consistent with Amsel's (1958) report. Amsel found that after an anticipatory reward response had been restablished, Ss approached a goal box more slowly following nonreward than following reward. This slower approach is assumed to be due to a conflict situation arising from the elicitation of anticipatory reward and anticipatory frustration by the same stimulus complex. Once the anticipatory frustration has been conditioned to the approach response, its elicitation results in an increment in performance.

The importance of anticipatory responses is suggested by the work of Bruning (1964, Penney (1960), and Ryan (1965). These investigators have all reported faster response speed following nonreward, after anticipatory frustration had been conditioned to the approach response and, thus, supports Amsel's (1958) theory. Since the increments in

response speed following failure occurred only after anticipatory frustration had become conditioned to the approach response, it may be assumed that no such conditioning occurred in this study. On the other hand since failure occurred before any movement response was made, and expectancy of success was established by instructions, it might have been expected that the drive due to failure should have added to the overall drive to produce increased vigor of responding. It might be argued that in this situation response latencies was not an adequate index of increased vigor, since response speed may have been affected by some orienting behaviour. The possibility exists that Ss attended exclusively to the predicted light. If this was the case, then it could be argued that such orienting behaviour may have interfered with the speed of responding on failure trials, while facilitating responding on success trials. Although this possibility exists, it would be difficult to defend in that the visual angle subtended by the two lights were such that both appeared in the S's visual field. Attention could, therefore, be paid to both lights simultaneously, minimizing eye movements and orienting to one or the other of the lights exclusively.

The task in this experiment, like that in Endsley's (1966) was presented as one of skill. The experiment was presented as an achievement situation in that the Ss were encouraged to evaluate his performance against that of others. A comparable situation existed in Ford's (1963) study where Ss had to perform within a prescribed time limit. Such studies may foster self evaluation, and might, therefore, be ego involving. If the assumption is made that the task in the present study was ego involving, then an interpretation based on this factor would appear

reasonable. Indeed it would seem to offer a more parsimonious explanation than either the concept of conditioning or the concept of orienting behaviour.

Haner and Brown (1955) have suggested that plunger pushing is an 'aggressive act'. Following this suggestion, Ford (1963) speculated that "...failure arising from the person's own inadequacy might result in a tendency to inhibit plunger pushing since the culturally prescribed reaction to such failure is one of self blame and inhibition of outward aggression..." (p. 345). He has further stated that if failure can be blamed on external agents then "...externally directed aggression would be less socially disapproved and, therefore, more likely to occur..." (p. 345). In the present study, as in Ford's (1963) and Endsley's (1966), the Ss perceived themselves as having control over their successes and failures. The results were increased latencies following failure. In studies that have demonstrated increased latencies following success (Penney, 1960; Ryan, 1965) the locus of control may be said to have been external. In situations where control is perceived as external, the S may react to failure with increased outwardly directed vigor. This statement about outwardly directed vigor of response is not to be taken as an assumption that there isn't increased vigor when control is internal. In the present study it might havebeen possible that increases in internal vigor (mental activity, greater concentration) were antagonistic to motor (external) reaction. That is, more attention was being given to the solution of the sequences, and the motor act became secondary at the time of failure. It might, therefore, be assumed that in ego involving tasks where the control of outcome is internal, it may be inappropriate

to assess increases in vigor by such external measures as force or speed of responding. This alternative interpretation is in agreement with the concepts of internal vs. external control as reviewed by Lefcourt (1966) and is also consistent with the theory of achievement motivation as presented by Atkinson and Feather (1966).

The further finding of faster M_2S than M_1S for both C trials and NC trials, suggests that the increase in speed is not primarily due to an increment in drive since increases in drive should have occurred only on NC trials. One plausible explanation is that the second experimental light which initiated M_2S played a relatively unimportant role for the subject. The first light and the plunger associated with it had greater significance for the S, because he was most involved with this light. He was successful or unsuccessful on this light and was involved with its onset. Such involvement could have acted as a competing response and may have resulted in overall slower M_1S on C trials. Failure and its possible consequences as mentioned above may have added a further dimension to the competing responses and have resulted in still slower speeds on NC trials.

The importance of considering personality and situational variables in analysing behaviour is supported by the four-way interaction for SS (see Fig. 2). The interaction demonstrates that although these variables were not by themselves decisive in determining responses, taken together they yield differential results. From this interaction it can be stated that when the task is difficult, Ss high in both achievement and anxiety perform faster than when the task is easy. Faster performance occurred regardless of success or failure, and was observed for all three speed measures, suggesting that when the task is perceived as difficult,

anxiety has a facilitative effect, providing the S is also high in achievement motivation. This interpretation supports the suggestion of Atkinson and Feather (1966) who state:

> "The interesting and non-obvious hypothesis suggested for future research is the notion that under conditions of very intense positive motivation, a strong tendency to avoid failure may actually enhance rather than hinder the efficiency of performance."

It is conceivable that the achievement motive, if high, keeps the S task oriented rather than motivating him to leave the field.

Subjects in whom $M_s > M_{af}$ had faster speeds in the easy condition than in the difficult condition regardless of success or failure. This finding supports Weiner's (1966) observation of better performance on an easy task then on a difficult task for Ss high in achievement motivation but low in test anxiety, supporting the assumption that $M_s > M_{af}$ Ss strive to maximize success.

The failure to obtain a main effect for n Ach., test anxiety, or level of expectancy, limits the interpretation and discussion of these variables. It may be argued that because university Ss were employed, the range of n Ach. and test anxiety was restricted and that the selection of the upper and lower extremes did not, therefore, significantly differentiate the test groups. This argument is difficult to support in that significant two, three, and four-way interactions were obtained. Furthermore, the analyses of the personal history data indicated that the groups were different in that significant chi-squares supported the division of Ss into high and low n Ach. and test anxiety.

It may of course be argued that the n ach. scale of the P.R.F. (Jackson, 1966) does not assess the achievement motive. McClelland (1958),

for example, has implied that n Ach. can only be measured by projective techniques. This suggestion, however, has been challenged by Myers (1964), who has clearly demonstrated that it is possible to reproduce the results typically found in achievement situations defined by projective techniques, by employing an objective scale to measure n Ach. It must also be noted that the description of n Ach. given by Jackson (1966) embodies the qualities of achievement that have been measured by TAT stories. Further, the correlation of .049 between Jackson's n Ach. Scale and Sarason and Ganzer's Test Anxiety Questionnaire is typical of correlations reported between n Ach., as measured by projective techniques and test anxiety. In summary, the procedure employed to measure n Ach. would seem to have been adequate. It would seem reasonable to suggest, on the basis of the interactions discussed, that greater attention may have been placed upon the solution of experimental tasks so as to maximize the effects of n Ach.

The consistent main finding of faster speeds following success than following failure suggests that in this study the locus of control of success played a more significant role than the other variables. In view of this, the support gained for hypotheses 3 and 6, and the contradiction of hypotheses 4 and 5 becomes somewhat incidental. Several investigators have shown that the behaviour of female Ss is difficult to predict on the basis of their n Ach. scores. (See, for example, , 1959). The inclusion of such Ss in this research may, therefore, have been responsible for the failure to confirm hypotheses 4 and 5. The four-way interaction was also due primarily to the performance of the female Ss. It will be recalled that when the results were analysed

separately for males and females, only the female data yielded a significant four-way interaction.

The analysis of the persistence data, although tentative due to the exclusion of extreme scores, yielded results consistent with achievement motivation (Atkinson & Feather, 1966). It was observed that Ss with $M_s > M_{af}$ are prepared to persist longer than Ss with $M_{af} > M_s$. This greater intended persistence existed regardless of level of difficulty of the task. A further tentative generalization would be that Ss with high n Ach. are prepared to persist longer than Ss low in n Ach. This generalization is supported by the tendency of Ss high in both n Ach. and test anx. to indicate that they would persist longer than Ss low in n Ach. and high in test anx. This difference between high n Ach. - high Anx., and low n Ach. - high Anx. Ss was only apparent in the easy condition. In the difficult condition, the fear of failure may have prompted Ss with low n Ach. or high test anx. to withdraw from the task. Subjects high in n Ach. - low test anx. seemed, therefore, to be prepared to persist longer than any other group of Ss in the difficult condition.

Males

A major finding for the male Ss was the important three-way interaction between n ach., confirmation, and difficulty level indicating the importance of personality and situational variables. Two factors were important for the three-way interaction: the shorter latencies of high n Ach. Ss following success on the easy condition and the shorter latencies of these same Ss following failure on the difficult condition. The data suggest, therefore, that the effects of failure on high n Ach. male Ss is to produce response inhibition if the task is perceived as easy.

If the task is perceived as difficult, then failure does not disrupt behaviour and performance is maintained at levels comparable to that following success.

This suggestion is consistent with Weiner (1965) who reported faster performance following failure at a difficult task than following failure at an easy task for high n Ach. Ss. One may conclude that for male Ss high in n Ach. failure results in improved performance on a difficult task.

Although this study was not designed to examine the important concept of inertial tendency, introduced into the theory of achievement motivation by Atkinson and Feather (1966), the finding of faster M_2S speeds following failure at a difficult task, provides support for it. It is reasonable to suppose that the prospect of succeeding at a difficult task arouses the motive to achieve success more strongly than does the prospect of succeeding at an easy task. If a strong motive to achieve success is aroused and is then thwarted by failure, a tendency to persist at the task would ensue (inertial tendency) which would result in greater effort. Indeed the concept of inertial tendency would predict that the effects of a non-confirmation trial would not dissipate rapidly for high n Ach. Ss.

Females

The finding of no significant effects on M_2S for females, suggests that for these Ss the effects of failure dissipate more rapidly than they did for males. It would appear that n Ach. situations are defined differently by female Ss as has been suggested by Lesser Knawitz, and Packard (1963).

The four-way interaction obtained for SS (Fig. 5) was similar to that obtained in the overall analysis (Fig. 2). There was only one exception to the similarity: there was no significant difference in the speed for $M_s > M_{af}$ Ss on NC trials between the easy and difficult conditions. Atkinson and Feather (1966) suggest that fear of failure might be facilitating in difficult situations is supported in that Ss high in anxiety and n Ach. had faster SS in the difficult condition than in the easy condition. This was found in both the overall analysis and in the analysis of the female data. The performance of female Ss high in test anx. and low in n Ach. and that of Ss low in n Ach. and low in test anx. was identical to the performance observed in the overall analysis. $M_{af} > M_s$ Ss had faster SS in the easy condition than in the difficult condition on confirmed trials. Success for these Ss may be viewed as non-confirmation of a weak expectation of failure, resulting in 'motivational relief' (Feather, 1963). One would, therefore expect an increase in speed. Failure on the other hand would result in an increase in fear motivation which if it had an effect would lead to response inhibition.

Subjects low in n Ach. and test anx. ($M_s = M_{af}$, Lo) had faster SS in the easy condition than in the difficult condition on NC trials. This suggests that in this situation the motive to achieve success was aroused. Due to increases in approach tendency following failure at an easy task, response speeds were maintained. Failure at the difficult task may have resulted in 'motivational disappointment' (Feather, 1963), hence inhibition of response on NC trials. The overall analysis indicated that Ss with $M_s > M_{af}$ had faster SS in the easy condition than in the difficult

condition regardless of C or NC. This was interpreted as an attempt by these Ss to maximize success. The female Ss with $M_s > M_{af}$, however, had faster speeds only on C trials. This would suggest that the female Ss strive only when they are successful, and when the probability of success is high. This might indicate that female's performance is governed primarily by external factors. The incidental observation that of the 10 Ss who indicated that they worked hard for an exam because of the marks seven were females, would support the hypothesis that external controls are more effective for females.

The general statement to be made from the two-way interaction for M_1S is that when a task is perceived as difficult, female Ss low in n Ach. have longer response latencies than when the task is seen as easy. The performance of high n Ach. Ss remains the same regardless of the perceived difficulty of the task. In the easy condition both high and low n Ach. Ss perform at the same rate. If it is assumed that Ss low in n Ach. approach the tasks with a reduced motive to achieve success, then the prospect of succeeding at a difficult task might arouse a motive such as fear of failure resulting in less efficient performance.

The most significant findings from the personal history questionnaire are those differentiating between Ss with $M_s > M_{af}$ and the other groups of Ss. The statements which differentiated the groups were those having to do with the expectancies of parents about children's behaviour, why they worked hard for exams, the effort put into tasks, and the intention to seek further academic achievement. The finding that most of the $M_s > M_{af}$ Ss were expected to do more things by themselves as children (95%) confirms Winterbottom's (1958) finding that n Ach. was related to

parental expectations for independence and mastery at an early age. High n Ach. Ss said they worked hard for an examination because they enjoyed the challenge, supporting the theory that high n ach. is associated with competition and is based on internal criteria of excellence. More (75%) of the $M_{af} > M_s$ Ss worked for examination marks rather than for the challenge, suggesting that perhaps these Ss were more externally controlled.

Subjects high in n Ach. generally do more work at a task than is required, whereas Ss low in n Ach. do only the minimum. It was observed, however, that 100% of Ss high in both achievement and anxiety said they did more than was required. This is similar to the earlier finding that the high achievement and high anxiety Ss performed faster in the difficult condition than the easy one. It is possible that for these Ss the fear of failure and the motive to achieve success combine to produce a strongly striving individual who defends against failure by increased effort. Totally consistent with the theory of achievement motivation was the greater number (85%) of $M_s > M_{af}$ Ss intending to go to graduate school, as opposed to 55% of $M_s = M_{af}$ Hi and 25% of $M_{af} > M_s$. Generally more high n Ach. Ss intend to seek further academic achievement than low n Ach. Ss.

Most Ss regardless of level of achievement or anxiety indicated that the family structure was anequalitarian one, that they had a closer relationship with mother and were infrequently punished. This suggests that the home environments did not differ drastically, and perhaps represented a relatively stable environment, reflecting the type of home within the culture from which university students are most likely to come.

The results of the post-experimental questionnaire indicated that the experiment did produce stress in most individuals. The data also indicated that the sequences appeared real, as most Ss tried hard to solve them, except for the Ss low in achievement and anxiety who reported that they did not try too hard. Although there was no significant differences in anxiety among the groups whether their predictions were correct or incorrect, most Ss indicated that they became more anxious when they were wrong in their predictions. This finding supports the interpretation offered to explain the obtained slower speeds following failure.

The preference of a task of intermediate difficulty in the $M_s > M_{af}$ group was shown; however, all groups indicated the same preference. This suggests that the need to achieve was perhaps aroused in all groups and Ss preferred to master the particular task before doing either one easier or more difficult.

From the preceding discussion it is seen that although the main finding is not contradictory to Amsel's (1958) position, his theory does not account for the differential performance of Ss. In fact his theory does not accommodate the influence of task difficulty or personality variables. Feather's model and the theory of achievement motivation offers a more parsimonious interpretation of the results. Feather's concept of motivational disappointment, however, was not convincingly demonstrated, neither was the frustration effect obtained. In light of this it appears that an integration of these two concepts remains for further research. The use of achievement motivation theory in general, and Feather's model in particular in the explanation of some of the results, in-

dicates that inferences drawn from Feather (1963) also have relevance for motor behaviour such as reaction time. Although the personality variables investigated did not yield independent significant results, it can be concluded that personality variables of the type employed in this study are important factors in behaviour. This is particularly evident in the interactions, and the differential performance of the different Ss in the easy or difficult conditions. In general, the performance of subjects supported other findings of studies in achievement motivation framework and is consistent with the theory. This consistency indicates that the measures of n Ach. and test anxiety used in this study are comparable to those employed in other achievement oriented studies. These findings suggest that Jackson's (1966) n Ach. scale, from his Personality Research Form, is measuring an achievement motive similar to that measured by projective techniques.

Earlier in the discussion, it was reasoned that the task in this study was ego-involving. It may be further speculated that when non-material rewards are employed, there is a tendency for the task to be viewed as ego-involving. Non-material rewards such as 'satisfaction' may result in Ss feeling more inept and psychologically inferior following failure, than when the rewards are material. In other words, when control of success and satisfaction reside within the Ss, failure would result in self-blame, and possibly lowered self-esteem. If this is the case, then external measures such as force or speed of responding may be inappropriate measures of Ss reaction to failure. Finally, the different reactions of males and females may point to the desirability of including larger more molar concepts such as cultural roles in moti-

vational theory. Culture to a large extent dictates how one will react in different situations. Besides the folkways and mores, culture also prescribes certain appropriate modes of behaviour to males and to females. Consequently, it might be expected that due to acquired sex roles, different types of behaviour might be observed. An interesting observation in this study, which was not pursued, was that in Group 2 Ss (Hi n Ach. Hi Anx.), 10 Ss stated they preferred to work at an exam for marks and 10 for the challenge. Of the 10 who worked for marks, seven were females, and of the 10 who enjoyed the challenge, seven were males. This, if followed up, might suggest that for high n Ach. females, the achievement motive is tied to external recognition, whereas as for males it might be for a sense of accomplishment. It is quite possible that when is called n Ach. is a different variable in males than in females. This suggests that the theory of achievement motivation should perhaps be expanded to consider cultural roles, especially sex roles, as have been attempted by Lesser, Knawitz, and Packard (1963), if predictions are to be made about the behaviour of the population at large.

SUMMARY AND CONCLUSION

Eighty subjects were selected from a pool of 297 subjects on the basis of their scores on a need achievement scale and a test anxiety questionnaire. Four groups of 20 Ss were devised, each consisting of 10 females and 10 males. The groups were: (1) Hi n Ach. - Lo Anx., (2) Hi n Ach. - Hi Anx., (3) Lo n Ach. - Hi Anx., and (4) Lo n Ach. - Lo Anx. Five male and five female Ss of each group were randomly assigned to either a difficult or easy condition. Each S was tested individually, and after he had observed a demonstration of a sequence of lights was asked to predict which of two lights would appear on a panel. He was then confirmed on his predictions 40% of the time by the onset of one of the lights. Whether he was right or not on his predictions, he was required to lift his hand from a handrest and press a plunger directly below the illuminated light, and keep it there until a second light was illuminated. When the second light came on, he had to press a second plunger located below it. The dependent measures were three speeds taken as the reciprocals of lift RT and two movement RTs. At the end of the experiment each S was asked to indicate how long he was prepared to continue at the task, which of three levels of task difficulty he would prefer, and to complete two brief questionnaires.

Analysis of the data revealed that failure or nonconfirmation resulted in an inhibition or motor responding regardless of difficulty of the task. Although no significant main effects were found for the other variables, significant interactions were obtained.

Motives, confirmation, and expectancy of success were found to interact to produce differential motor responding. These variables had idiosyncratic effects depending on the sex of the S. The effects of failure were found to persist longer in the male Ss than in the female Ss, and was most pronounced in male Ss who were high in n Ach. These Ss performed faster following failure in a situation perceived as difficult, than in an easy situation. In the female Ss the effects of failure dissipated quickly as evidenced by a lack of significant results in M_2S. Further, the interaction of motives, confirmation and expectancy of success was evidenced earlier in the response sequence of female Ss than in male Ss.

From the performance of the Hi n Ach. - Hi Anx. Ss in the difficult condition it was concluded that the arousal of anxiety in a difficult situation is facilitating when the subject is high on both achievement motivation and anxiety but inhibiting when the subject was low in anxiety but high in achievement. The general conclusion was that Ss high in n Ach. were prepared to persist longer at a task regardless of difficulty, than low n Ach. Ss. The data were interpreted as providing support for inertial tendency as postulated by Atkinson and Feather (1966).

The results provided partial confirmation of Amsel's theory. The model of motive expectancy and incentive within the theory of of achievement motivation, however, was considered most applicable to the findings.

APPENDIX A

PERSONAL HISTORY QUESTIONNAIRE

1. How many children are there in your family?

2. What position do you occupy in the sibline - 1st, 2nd, 3rd, 4th .....?

3. What is the difference in age between yourself and

   (a) your older sibling (one before you)
   (b) your younger (one after you)

4. Which would you say represented your family structure

   (a) Authoritarian (Patriarchal).
   (b) Authoritarian (Matriarchal).
   (c) Equalitarian.
   (d) Democratic.

5. Into which category would your father's occupation fit?

   (a) Professional.
   (b) White Collar.
   (c) Blue Collar.
   (d) Skilled Labourer.

6. With which parent did you have closer relationship?

   (a) Mother (b) Father

7. At what age did you start going to school?

8. Did your parents insist on a good report card?

   (a) Mother (b) Father (c) Both

9. Was coming to University

   (a) your own idea
   (b) your parents
   (c) your friends
   (d) the question of not going never came up.

Personal History

10. Which was the predominant form of disciplinary action used by your parents?

    (a) Physical punishment.
    (b) Isolation.
    (c) Withdrawal of privileges.
    (d) Other (specify).

11. Were you punished often? Yes..... No.....

12. Were your rewards mostly

    (a) Material (Money, etc.)
    (b) Social (Good, etc.)

13. Would you be apt to work harder for an exam because you will be

    (a) humiliated by failure (b) rewarded.

14. Would you be apt to work hard for an exam because

    (a) to get a high mark.
    (b) you enjoy the challenge of the exam, and being right.

15. In doing a task would you be apt to do more than is actually required?

    Yes..... No.....

16. Did your mother attend university?

17. Did your father attend university?

18. Did you come to university directly from High School?

19. Do you intend to go on to graduate school?

APPENDIX B

POST EXPERIMENTAL QUESTIONNAIRE

1. How anxious were you during the experiment?

   Very Anxious ( ) Slightly Anxious ( ) Not Anxious ( )

2. Did you become more anxious or tense when you were wrong in your predictions?

   Yes..... No.....

3. How hard did you try to solve the sequence?

   (a) very hard. (b) not too hard. (c) I was only guessing

4. How hard did you try to react as fast as possible?

   (a) very hard. (b) not too hard. (c) did not try at all.

5. Did you try harder in: (a) Practice Trials or (b) Experimental?

6. Did you become more anxious when you were successful? Yes.... No....

7. Did you try harder when you failed to be successful in predicting?

   Yes..... No.....

8. Did you try harder when you were successful?

   Yes..... No.....

APPENDIX C

Mean SS, M_1S and M_2S on C and NC Trials at 2 Levels of Expectancy for the 4 Groups

SS

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	2.625	2.044	2.054	1.638	2.480	1.624	2.278	1.852
Lo Expect	2.209	1.703	2.656	2.151	2.076	1.722	2.232	1.441
t	3.43	2.82	4.99	4.24	3.35	1	1	3.39
P	<.01	<.05	<.001	<.001	<.01	ns	ns	<.01

M_1S

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	1.244	1.033	1.047	0.872	1.173	0.939	1.176	0.977
Lo Expect	1.162	0.918	1.336	1.121	1.058	0.894	1.053	0.789
t	1	1	4.19	3.61	1	1	1	2.72
P	ns	ns	<.001	<.01	ns	ns	ns	<.05

M_2S

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	1.734	1.663	1.452	1.323	1.509	1.508	1.507	1.421
Lo Expect	1.675	1.551	1.712	1.629	1.559	1.459	1.497	1.529
t	1	1	3.06	3.60	1	1	1	1
P	---	---	<.01	<.01	---	---	---	---

APPENDIX D

Mean SS, M_1S and M_2S on C and NC Trials at 2 Levels of Expectancy for Male Ss

SS

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	2.562	2.104	2.092	1.556	2.096	1.636	2.252	1.862
Lo Expect	2.34	1.684	2.616	2.186	2.094	1.814	2.398	1.549
t	1	2.45	3.064	3.684	1	1	1	1
P	---	<.05	<.01	<.01	---	---	---	---

M_1S

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	1.286	1.068	1.108	0.900	1.012	0.844	1.228	1.042
Lo Expect	1.200	0.930	1.390	1.166	1.096	0.966	1.156	0.882
t	1	2.71	5.52	5.21	1	2.93	1	3.14
P	---	<.05	<.001	<.001	---	<.05	---	<.01

M_2S

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	1.926	1.748	1.492	1.312	1.500	1.530	1.602	1.524
Lo Expect	1.686	1.612	1.740	1.704	1.516	1.320	1.698	1.698
t	3.87	2.19	4.00	6.32	1	3.39	1	2.81
P	<.001	<.05	<.001	<.001	---	<.01	---	<.01

APPENDIX E

Mean SS, M_1S and M_2S on C and NC Trials at 2 Levels of Expectancy for Female Ss

SS

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	2.688	1.984	2.016	1.720	2.864	1.612	2.304	1.842
Lo Expect	2.184	1.722	2.696	2.116	2.058	1.630	2.068	1.334
t	---	2.611	3.523	2.052	4.176	---	---	2.63
P	ns	<.05	<.01	<.05	<.001	ns	ns	<.05

M_1S

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	1.202	0.998	0.986	.844	1.334	1.034	1.124	0.912
Lo Expect	1.124	0.906	1.282	1.076	1.020	0.822	0.950	0.696
t	---	---	3.402	2.666	3.609	2.436	---	2.482
P	ns	ns	<.01	<.01	<.01	<.05	ns	<.05

M_2S

Groups	1		2		3		4	
	C	NC	C	NC	C	NC	C	NC
Hi Expect	1.542	1.578	1.412	1.334	1.518	1.486	1.412	1.318
Lo Expect	1.664	1.490	1.684	1.553	1.602	1.598	1.296	1.360
t	---	---	2.66	2.16	---	---	---	---
P	ns	ns	<.01	<.05	ns	ns	ns	ns

APPENDIX F

Calculation Summary of Differences Between M_1S and M_2S on NC Trials

D	=	-45.45	D^2	=	34.3678
$\overline{D}$	=	- .57	$\overline{D}^2$	=	.3249
S_{D^2}	=	$D^2 - (\overline{D}^2)$		=	0.1047
$S_{\overline{D}}^2$	=	$\frac{SD^2}{N-1}$		=	0.0013
$\underline{t}$	=	$\frac{\overline{D}}{\sqrt{S_{\overline{D}}^2}}$		=	15.8
df	=	79	$P < .0001$		

Calculation Summary of Difference Between M_1S and M_2S on C Trials

D	=	- 33.97	D^2	=	20.0945
$\overline{D}$	=	0.4245	$\overline{D}^2$	=	.1802
S_D^2	=	0.0710			
$S_{\overline{D}}^2$	=	0.0299			
$\underline{t}$	=	14.214			

$P < .0001$

APPENDIX G

Length of Time (in Mins.) each S Prepared to Persist **

Hi Expect.

Hn Ach.-L. Anx.	Hn Ach.-H. Anx.	Ln Ach.-H. Anx.	Ln Ach.-L.Anx.
30	0	45	15
30	15	5	10
60	40	0	10
30	60	0	5
20	20	60	15
30	10	0	10
10	10	5	10
60 $\bar{X}$ = 28.0	10 $\bar{X}$ = 23.0	0 $\bar{X}$ = 12.4	30 $\bar{X}$ = 16.5
5 SD = 18.7	30 SD = 16.9	4 SD = 20.4	60 SD = 16.3
5	30	5	0

Lo Expect.

120	45	30	10
30	10	5	30
5	120	0	30
60	30	150	30
30	10	30	10
30	10	30	30
10	10	0	15
60 $\bar{X}$ = 55.5	15 $\bar{X}$ = 26.0	2 $\bar{X}$ = 28.7	60 $\bar{X}$ = 23.5
30 SD = 51.3	10 SD = 33.6	10 SD = 42.4	5 SD = 15.3
180	0	30	15

** first five scores in each level of Expect. are Males.

APPENDIX H

Summary of Analysis of Variance for Data on Persistence

Source	SS	df	MS	F
Expect.	3,618.05	1	3,618.05	3.62
Groups	6,281.10	3	2,093.70	2.09
Interaction	1,781.65	3	593.88	0.594
W/C	71,958.00	72	999.42	

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