THE TAYLOR-SPENCE DRIVE THEORY ON A COMPETITIVE VERSUS NONCOMPETITIVE PAIRED-ASSOCIATE LEARNING TASK

by

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THE ABSTRACT

The Taylor-Spence Drive (D) theory was investigated by comparing performance of high anxiety (HA), medium anxiety (MA) and low anxiety (LA) Ss, as measured by the Children's Manifest Anxiety Scale, on the test list of both a response-equivalence paradigm (A-B, A-C) and a control paradigm (D-B, A-C). The Ss were 60 grade six boys. The paired-associate learning tasks were designed to detect the debilitating effects of associative-stage competition in the experimental group for HA, MA and LA Ss respectively. A two (experimental conditions) by three (anxiety levels) by six (repeated trials) analysis of variance was performed on the data. There is a significant difference in performance between experimental and control groups on the test list (A-C), $p < .0005$. There are several trends favourable to the Taylor-Spence D theory but chance factors could have been involved since none of the hypotheses generated from the theory reached the .05 significance level. The first favourable trend is that HA and MA Ss' performance tends to be superior to LA Ss' in the control group on the test list (A-C). Also, HA Ss' performance is inferior to LA Ss' in the experimental group on the test list (A-C) giving support to the interaction hypothesis.

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CHAPTER I - THE INTRODUCTION

The Taylor-Spence Theory (Spence, 1958; Spence, et al., 1966; Taylor, 1953) of emotionally based drive (D) as reflected by scores on anxiety questionnaires, has stimulated a great deal of research. The theory is based on the conception that the hypothetical emotional response r_e is aroused by noxious or aversive stimuli increasing the D level of the organism. The Taylor Manifest Anxiety Scale (MAS) (Taylor, 1953) and its variant, the Children's Manifest Anxiety Scale (CMAS) (Castaneda, et al., 1956) are the operational measures of the individual differences in r_e. D is conceived to be a direct function of the strength of the organism's r_e. The earlier position that relates Ss' D Level to MAS and CMAS scores is that high anxiety (HA) Ss manifest a higher D level than medium anxiety (MA) or low anxiety (LA) Ss in all situations regardless of stress condition. However, a recent study (Spielberger, et al., 1966) has given evidence supporting a second position that HA Ss have a higher D level than MA or LA Ss only in situations where there is some degree of stress present. In Spielberger and Smith's study (1966), performance on a list of 12 nonsense syllables was related to the Ss' manifest anxiety level under stress conditions, but not under neutral

conditions. It is because of these recent findings that the present experiment will be conducted under moderate stress conditions.

The Taylor-Spence theory conceives that anxiety is as an acquired D which has the capacity to motivate or energize the organism. The higher the anxiety (D) level, the greater the energizing properties. One prediction based on this view is that if only one response is available to a given stimulus, and if it is the correct one, HA would motivate the individual to perform thus facilitating learning of that response. This prediction has been substantiated many times in simple eyeblink conditioning experiments using the MAS as a measure of the Ss' anxiety (D) level (Spence, et al., 1966). However, in most learning tasks there is a multiplicity of response tendencies available to a given stimulus. The position of any one response in this hierarchy of responses depends on the past habits and experiences of the organism. Since anxiety (D) is conceived to be a multiplier of all habits elicited by a specific stimulus, it will tend to strengthen each of these habits in proportion to its initial strength.

One of the ways in which the construct validity of the Taylor-Spence D theory can be examined would be through the use of paired-associate (PA) and serial-learning tasks. Most of the early studies using serial-learning

tasks have reported that HA Ss' performance is superior to LA Ss' when the dominant response is the correct one, but inferior when the dominant response is the incorrect one (Lazarus, et al., 1954; Montague, 1953). In Montague's study (1953), anxious and nonanxious Ss, as measured by the MAS, were randomly assigned to each of three lists of 12 nonsense syllables of varying difficulty. It was hypothesized that high anxiety would aid performance on the easiest of three lists and decrease it on the hardest. It was reasoned that correct tendencies would be more frequent and stronger in the easiest list and that incorrect tendencies would dominate in the hardest list. The relative number of correct and incorrect tendencies elicited by each list was manipulated by varying intra-list similarity and association value of the nonsense syllables employed. List 1 items are of high similarity and low association value; List 2 items are of low similarity and low association value; while List 3 items are of low similarity and high association value. Performance was in the predicted direction. Anxious Ss performed better than nonanxious Ss on the easiest task and performed relatively poorer as the task became more difficult. On the hardest task, HA Ss' performance was significantly inferior to LA Ss'.

Although most of these early studies tended to support the Taylor-Spence D theory, none of them considered the competing responses within the serial list and hence were unable to compare performance of HA and LA Ss at different stages in learning. It was not studied so until Spielberger and Smith (1966) considered opposing facilitative and debilitating effects of anxiety within the serial list. One group of Ss learned a list of 12 nonsense syllables under stress conditions and a second group learned the same task under neutral conditions. Performance was compared on the nonsense syllables which elicited the fewest errors in the list with those that elicited the most errors (easy vs. hard words). The results were consistent with the Taylor-Spence theory for Ss under stress but not neutral conditions. Performance of HA Ss was inferior to that of LA Ss on both easy and hard words in the first trial block, superior on easy words but inferior on hard words in the second trial block, superior on both types in the third block. Thus, the results from this study indicated that correct response tendencies are weaker than competing tendencies in the early stages of learning, but become stronger as learning progresses.

Standish and Champion (1960) compared the performance of high, medium and low anxious Ss, as

measured by the MAS, on an easy list (A-B) and on a hard list (A-C) of paired-associates. HA Ss' performance was superior on the easy list, but inferior on the hard one when compared to LA Ss'. Although performance was in accordance with the Taylor-Spence D predictions for HA and LA Ss, performance of the MA Ss did not always fall in the intermediate position as expected. When the incorrect response was dominant (early stages of difficult list), the MA Ss' performance was approximately the same as HA Ss'. When the correct response was dominant (easy list, late trials of difficult list), the MA Ss' performance fell in the same range as that of LA Ss. These equivocal findings for the MA Ss in the study suggest further clarification of the findings as related to the construct validity of the MAS. Although the Taylor-Spence theory is not questioned, the point should be made that perhaps the theory itself does not adequately account for performance of MA Ss. Cronbach and Meehl (1955), however, caution that the attainment of negative results, in attempting to validate a theory, does not indicate whether the theory or the instrument that purports to measure it should be rejected or, even whether the experimental design failed to test the hypothesis properly. They argue that the experimenter must look at the nomological network which is based on the evidence from all the studies on

the theory being investigated, and not just at the results from one isolated experiment.

Another important study on the Taylor-Spence D theory was done by Katahn (1964). In this experiment, a stimulus was presented to the S along with eight response choices. The choices were made up of two synonyms of the stimulus word, two antonyms, two rhymes and two words frequently associated with the stimulus. This task was designed in order to determine the relative habit strengths of responses before starting the learning task. Previous pilot work indicated that Ss selected synonyms followed by contiguous associations, antonyms and rhymes when asked to choose one of eight responses to a given stimulus without being constantly reinforced for their choice. The results showed that HA Ss' performance was superior to LA Ss' in the acquisition of the synonym response. Since this response was the dominant one, the results were interpreted as consistent with the Taylor-Spence D theory.

Katahn (1965), in an almost identical experiment to the one described above, predicted that high anxiety would interfere with the acquisition of weaker response tendencies. Ss were reinforced to a predetermined criterion on their dominant response tendencies. Half of the Ss were then switched to their second ranking response

tendency, and the other half to their lowest ranking one. Although the results did not reach significance, the performance of HA Ss in this study was inferior to LA Ss' on the second and, even to a greater extent, on the lowest ranking tendency. The major defect in this experiment was that the second and lowest ranking response tendencies were based on group norms and not on the individual Ss' rank. Katahn and Lyda (1966) overcame this deficiency in a later study by determining the response tendencies of each individual S before beginning the learning task. They report that HA Ss' performance was superior to LA Ss' on the acquisition of response tendencies highest in the Ss hierarchy and inferior on those that were lowest in the hierarchy.

Dunn (1968) investigated competing response tendencies, anxiety and stress on the learning of verbal concepts at three different levels of complexity. Stress conditions were employed by negatively conditioning Ss with shock to stimulus words which they were to learn later. The item complexity was varied by increasing the number of words and hence the number of incorrect tendencies in each task. The fact that all Ss' performance on the task of learning verbal concepts became more inferior to others' as the tasks become more difficult was interpreted as evidence of Hull-Spence theories of

competing response tendencies. The expectation that HA Ss would do more poorly than LA Ss on each verbal concept task, because anxiety (D) would increase the strength of the competing incorrect tendency, appeared consistent with the theory, but possibly was due to chance factors, since the results did not reach the significance level. The expectation that both HA and LA Ss would show a decrement in performance because of the inducement of shock was ascertained in the most complex task. In the easiest task, both groups of Ss improved their performance under stress conditions, although not at the significance level. The explanation for the observation was that in simple tasks, correct response tendencies are dominant in the hierarchy. Thus, increased anxiety (D) as induced by the electric shock would increase, according to the Taylor-Spence theory, the probability of the occurrence of the correct response.

Other studies have reported results inconsistent with the Taylor-Spence D concept (Katahn, et al., 1964; Lott, et al., 1968; Sassenrath, et al., 1964). Katahn and Dean (1964) had Ss learn two PA lists in order to investigate the effects of manifest anxiety on performance as a function of manipulated response strength. The first list was made up of 12 terms (A-B). The first six items of the second list were identical to one-half of the first one except

that the stimuli and responses were reversed (B-A). The other six items of the second list, used the remaining responses of the first list as stimuli and new words as responses (B-X). At the conclusion of trials in List 1 (A-B), the B words were presented orally. The Ss were then asked to give the first response that occurred to them. It was shown, by using this procedure, that A words were higher in the response hierarchy of B words than other response tendencies. Thus, it was reasoned that in the B-A section of List 2, the correct response would be dominant leading to the Taylor-Spence expectation that HA Ss would give more correct and fewer overt incorrect responses than LA Ss. In the second section of List 2 (B-X), it was reasoned that the incorrect response would be dominant, leading to the expectation that HA Ss would give fewer correct and more overt incorrect responses than LA Ss. The results were not in accordance with these expectations. HA Ss gave significantly more overt incorrect responses in both sections of List 2, and tended to give more correct responses, also, in both sections. Katahn and Dean (1964) reported, in their discussion of these contradictory findings, that the dominant response is not the correct one for all the pairs at the start of learning in the B-A section of List 2. The investigators also reported

that results from a study with a preliminary group indicated that about one-half of the pairs in the B-A section of List 2 were known at the start of learning of this list, presumably because of backward associations established in List 1 (A-B) learning. Thus, in accordance with the Taylor-Spence D theory, HA would be expected to facilitate learning in the part of the B-A section of List 2 in which the correct response is dominant, yet retard learning in the other part of the same list in which the incorrect response is dominant. It would then appear that the major weakness in the study by Katahn, et al., 1964, is that the results were confounded by the opposing facilitative and interfering effects of anxiety within the B-A section of List 2.

Another study (Sassenrath, et al., 1964) reported no difference in performance between high, medium and low anxious Ss on four different PA lists. It had been expected that HA Ss would perform better than MA and LA Ss on the two noncompetitive lists of varying difficulty, but that LA would do better than MA and HA Ss on the two competitive lists of varying difficulty. The failure to achieve the predicted results led Sassenrath et al., (1964), to question the validity of the MAS as a measure of emotionally based D as conceived by Hull-Spence as Standish and Champion (1960) had done earlier.

While some studies, such as the two just cited (Katahn, et al., 1964, Sassenrath, et al., 1964), have reported results discordant with the Taylor-Spence D theory, many others have reported results upholding the theory. However, at the present time, there is not enough evidence to reject the theory or the instruments, the MAS and the CMAS, which purport to measure it. The lack of significance as reported in some studies could well be due to experimental defect, or even due to statistical error, such as Type II error. This investigator decided to accept the CMAS as a satisfactory instrument, recognizing that there is no way to know if this is so, except by the accumulation and continued evaluation of evidence.

The study by Sassenrath, et al., 1964, seems to have suffered from experimental defect, since no consideration was given to the opposing facilitative effects of response-stage learning and interfering effects of associative-stage learning contained in the PA lists for the different anxiety (D) levels. Yet, PA learning had been analyzed, in earlier studies, into two functional stages, the response-stage and the associative-stage (Underwood, et al., 1959; Underwood, et al., 1960). In the context of these studies, the response-stage involves learning the responses as single units without regard to

previous associations, while the associative-stage involves making the associations or connections between the stimuli and the responses. Since HA has been reported as facilitating learning of single responses in many experiments (Spence, et al., 1966), the Taylor-Spence expectation, in the response-stage of PA learning, is that HA Ss' performance would be superior to MA Ss' and MA Ss' superior to LA Ss'. However, since the debilitating effect of response competition is localized at the associative-stage of PA learning, the Taylor-Spence expectation is that HA Ss' performance would be inferior to MA Ss' and MA Ss' inferior to LA Ss' in this stage of learning. Will Taylor-Spence D theory be substantiated in a PA learning task when both the facilitating effects of the response-stage learning and the interfering effects of the associative-stage competition are considered? The major objective of this study is addressed to this question.

The hypothesis which has been generated on the basis of the Taylor-Spence D theory is that if a learning task can be established in which the incorrect response is dominant due to competing response tendencies, then high anxiety (D) acting as a general energizer or motivator of behaviour, will energize this response causing retardation in learning the correct response.

In order to test this prediction, it is necessary

to compare performance on a response-equivalence paradigm (A-B, A-C) with a control paradigm (D-B, A-C). Consider a task situation where the Ss in the experimental group learn List 1 (A-B) as a training task and the Ss in the control group learn List 2 (D-B) as a training task in the first stage of learning. Also consider that both lists are learned to a criterion of two consecutive errorless trials before the second stage of learning begins in order to firmly establish the correct association between the stimulus (A) and its response (B) for the experimental group, and between the stimulus (D) and its response (B) for the control group. Since the stimuli (A and D) are different on the training lists (A-B,D-B), they need to be equated for meaningfulness and concreteness (Paivio, et al., 1968) in order to make these lists equally difficult to learn in either experimental or control conditions. It can be assumed that in the test list (A-C), Ss in the experimental group experience competition between the stronger, previously learned response (B) and the weaker to-be learned response (C). Furthermore, this should cause interference with the correct association of C and A resulting in the incorrect response being initially dominant. In this case, HA Ss' performance connecting the correct A and C terms would be expected to be inferior to MA and LA Ss'. However, in

the response-stage of learning, since the responses are learned as individual units without regard to previous associations, facilitation of performance for HA Ss over MA and LA Ss would be expected. Since familiar, two-digit numbers (Battig, et al., 1962) are used for the response terms in all lists, it is assumed that differential facilitation of response-stage learning is not as great as differential retardation of associative-stage learning. This rationale leads to a hypothesis that the performance of HA Ss would be inferior to that of MA Ss' which would in turn be inferior to that of LA Ss' on the test list (A-C) for the experimental group.

There should be no adverse effects due to competition in the control paradigm (D-B, A-C) since the A and C terms are different from the D and B terms. In this regard, concrete, meaningful but dissimilar four-letter nouns have been used as stimuli (Paivio, et al., 1968) in order to minimize interlist competition between List 2 (D-B) and the test list (A-C) for the control group Ss. Since the test list (A-C) is the same for Ss in both experimental and control conditions, response-stage learning should be the same for both groups. The expected difference in performance between the experimental and control groups should then be due to the effects of response competition for Ss in the experimental group. Thus, it was

hypothesized along this reasoning, that performance by the experimental group, regardless of anxiety level, would be expected to be inferior to performance by the control group.

Since there should be no adverse effects due to competition in the control paradigm (D-B,A-C), as discussed in the previous paragraph, there should be no difference in performance in the associative-stage of learning for the three levels of anxiety. However, it is expected that there would be a difference in performance in the response-stage of learning, since HA is expected to facilitate learning of responses as single units (Spence, et al., 1966). A hypothesis following this rationale is that HA Ss' performance would be expected to be superior to MA Ss' and MA Ss' superior to LA Ss' in the test list (A-C) of the control paradigm (D-B, A-C).

The difference in performance between the experimental and control groups, in terms of performance on the test list (A-C), for each of the three levels of anxiety, should reflect both the differential effects due to competition at the associative-stage of learning in the experimental group and the differential effects due to response-stage learning in the control group, across the three levels of anxiety. It is expected that HA Ss'

performance in the experimental group would suffer more from response competition than MA Ss' and that MA Ss' performance would suffer more than LA Ss'. It is also expected that HA Ss' performance in the control group, would gain more from response-stage learning than MA Ss' and that MA Ss' performance would gain more than LA Ss'. For these reasons, an interaction between performance by the experimental group vs. performance by the control group and the three levels of anxiety is expected.

One of the factors necessary to investigate before testing the hypotheses, is the relationship between anxiety and intelligence for the Ss used in the study. In this regard, it was decided to use the Henmon-Nelson Test of Mental Ability (HNTMA) as the measure of intelligence because of the ease of administration, the wealth of normative data available and its emphasis on verbal abilities. If it is found that there is a relationship, then it will be necessary to control for intelligence by one of various means, such as using the HNTMA score as a covariate in an analysis of covariance design, or restricting the study to Ss in a specific range of intelligence scores. If there is no relationship, then random assignment of Ss in the experimental or control group within each level of anxiety (high, medium and low) should result in groups which differ with respect to anxiety, as measured by the CMAS, but not with respect

to ability, as measured by the HNTMA, except by chance, and then only in small amounts in view of the number of Ss participating in the experiment.

The reason that the measure of intelligence has been incorporated in the experimental design is because of the equivocal research findings between the relationship of anxiety and intelligence. While many studies have found no correlation between CMAS scores and intelligence, many others have found a slight to moderate negative correlation. Kitano (1960) found no significant correlation between anxiety and intelligence in a study investigating the validity of both the CMAS and the Modified Revised California Inventory. Hafner, et al., (1960) reported no significant correlation between CMAS and the full scale Wechsler Intelligence Scale (WISC) scores given to 42 elementary school children. However, nine out of the ten WISC subtest scores were negatively correlated with the CMAS, with two of them reaching the significance level. McCandless, et al., (1956) reported a nonsignificant negative correlation between CMAS and Otis intelligence scores for grade six boys, but a significant negative one for grade six girls. However, Feldhusen, et al., (1962) obtained significant negative correlations between CMAS and WISC intelligence scores for both boys and girls.

DEFINITION OF TERMS: The following are the operational definitions used in the study.

1. High anxious (D) Ss are those whose CMAS scores fall in the top third of the sample distribution.
2. Medium anxious (D) Ss are those whose CMAS scores fall in the middle third of the sample distribution.
3. Low anxious (D) Ss are those whose CMAS scores fall in the bottom third of the sample distribution.

CHAPTER II - METHODOLOGY

Experimental design. The CMAS and the HNTMA were administered to all the grade 6 pupils in two representative schools of District 20, Saint John, New Brunswick. Both tests were administered on a group basis in separate sittings. The CMAS was given by the home room teacher in each class after an instruction session conducted by the investigator. The HNTMA was administered by the principal in one of the schools and by the guidance counsellor in the other. Although only the results of the male Ss were required for this study, all pupils were tested because of the convenience in administering the group tests to each class as a single unit, and also to provide the schools with the additional information gathered from the results.

After the group testing had been completed, the results for the male Ss were analyzed in order to determine the relationship between anxiety and intelligence for the pupils in the schools selected. After it had been determined that there was no relationship, including no evidence of nonlinearity (see Figures 1,2), the Ss were ranked according to their CMAS score. The upper, middle and bottom thirds of the distribution were classified as high, medium and low anxious Ss respectively (see Figure 3).

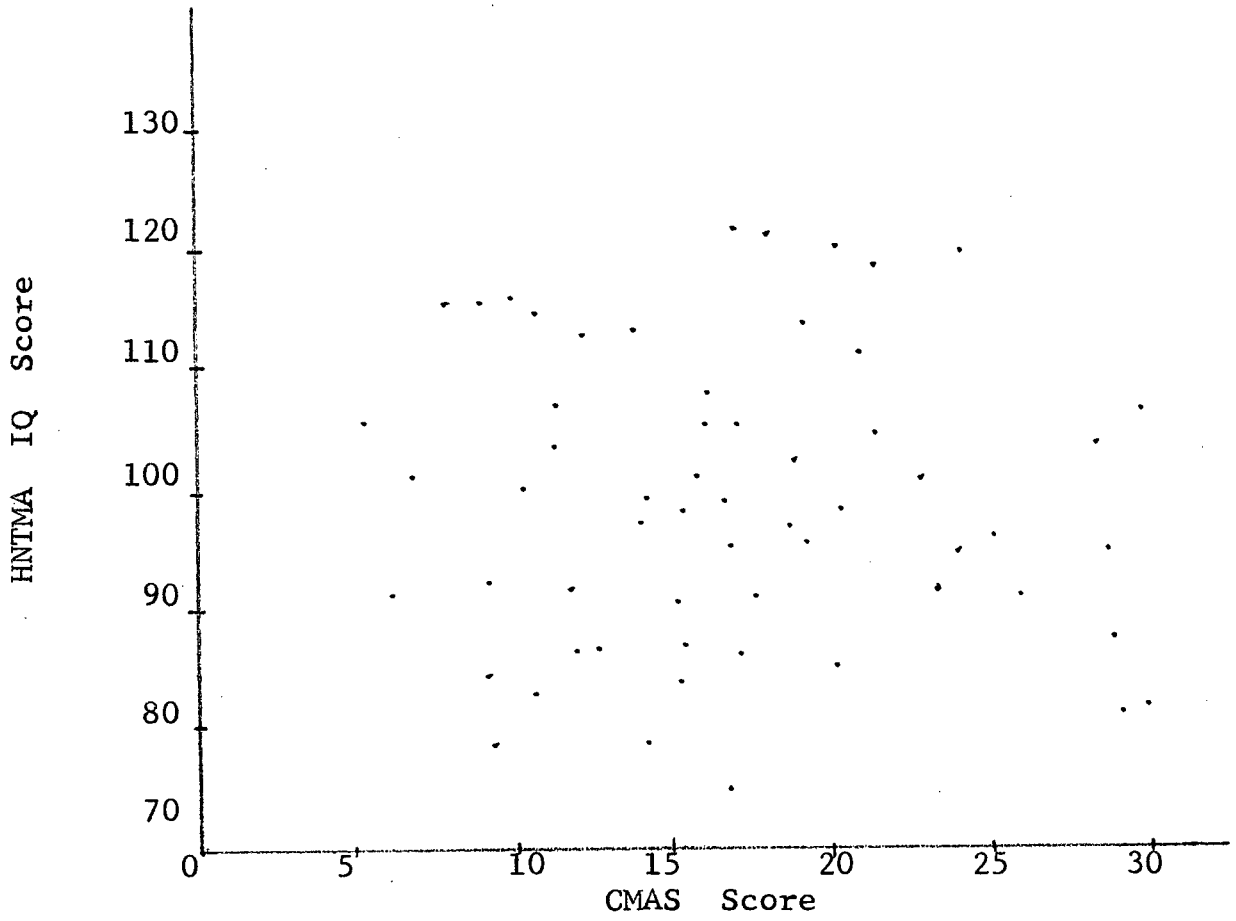

Fig. 1: CMAS Score & HNTMA IQ Score

r=0.0351

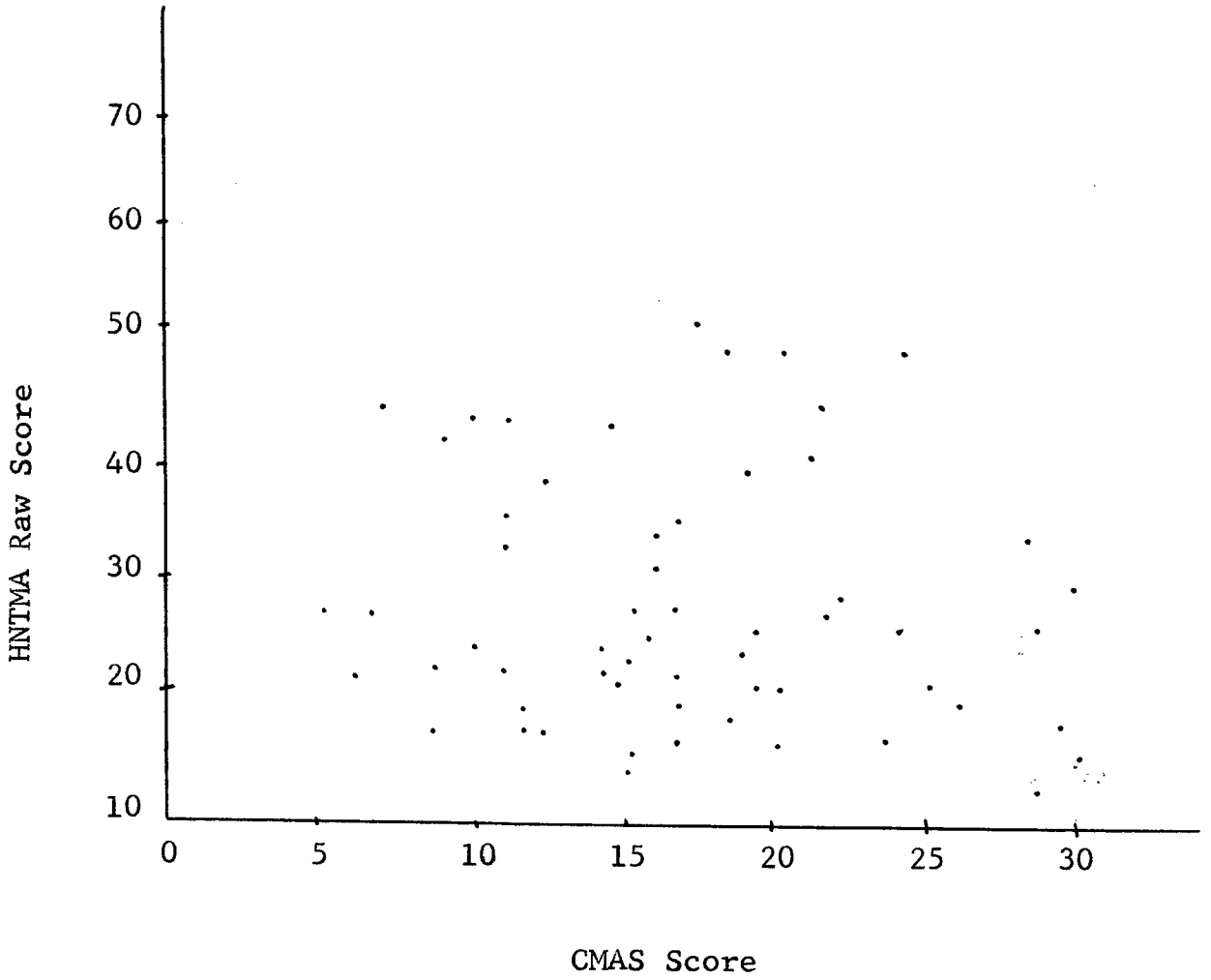

Fig. 2: CMAS Score & HNTMA Raw Score

r= -0.0550

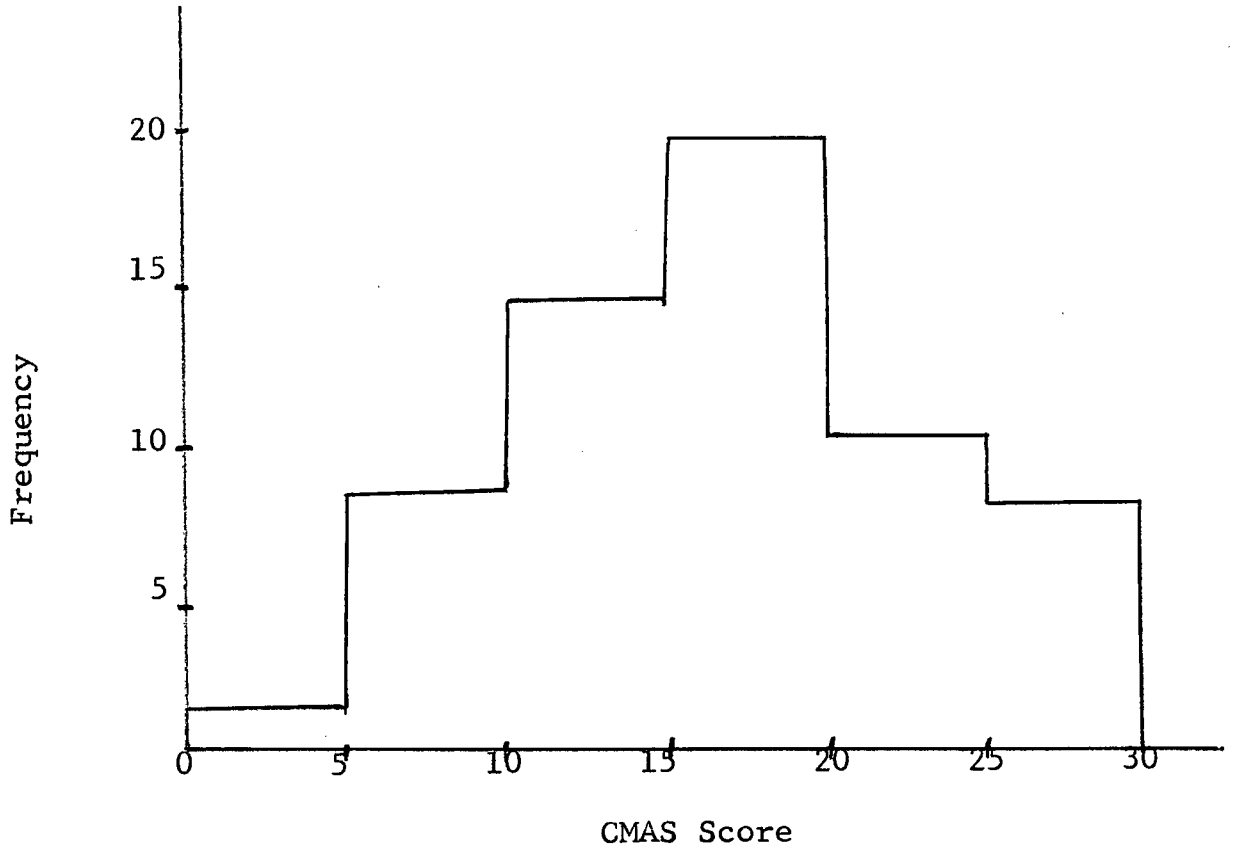

Fig. 3: CMAS Distribution

Mean - 16.71 Standard Deviation - 7.132

Ss within each classification were then randomly assigned, using a random table of numbers, to either the experimental or control groups. By using this procedure it can be assumed, as stated earlier, that the groups should not differ in ability, except by chance, as measured by the HNTMA; but should differ in anxiety, as measured by the CMAS. In this regard, the HNTMA means and standard deviations in the experimental group are: 102.0, 12.0 for HA Ss; 101.4, 14.7 for MA Ss; and 98.7, 13.5 for LA Ss respectively. In the control group, the HNTMA means and standard deviations are: 99.4, 13.4 for HA Ss; 95.9, 11.1 for MA Ss and 99.5, 14.1 for LA Ss respectively. The CMAS means and standard deviations are: 23.5, 4.0 for HA Ss; 16.2, 1.5 for MA Ss; and 9.6, 3.8 for LA Ss respectively. In the control group, the CMAS means and standard deviations are: 24.5, 3.7 for HA Ss; 16.3, 1.6 for MA Ss; and 9.1, 3.0 for LA Ss respectively. The CMAS scores range from 0 to 14 for LA Ss, 14 to 19 for MA Ss and 19 to 30 for HA Ss.

Six weeks after completion of the group testing, the Ss were individually tested on a PA learning task. The Ss in the experimental group learned a training list (A-B) of paired-associates to a criterion of two consecutive errorless trials. The control group Ss learned a second training list (D-B) to the same criterion. All Ss then

learned a common test list (A-C) also to a criterion of two consecutive errorless trials. On the test list (A-C), the Ss were run for at least 12 trials, even if they had reached criterion before the twelfth trial. This was done so that there would be a substantial number of trials to analyze without making the further assumption that those who had already reached criterion would continue to make errorless trials. The exposure to 12 trials was deemed, from previous pilot work, to be a reasonable number to use without fatigue and boredom becoming major factors.

The individual testing was done by one experimenter, who is the present investigator, in order to standardize the administration of the PA task and hence to minimize error variance due to examiner differences.

Sampling description. The two schools used in the study were selected by independent school officials as ones representative of the socio-economic conditions of the community, Saint John, N. B. (see Appendices 1, 2, 3). Saint John is the largest city in the Province of New Brunswick having a population of approximately 100,000. District 20 encompasses the city of Saint John and its suburbs. The School Board Report issued in the fall of 1969 stated that there was an enrolment of 24,436 pupils in the district at that time, of which 13,343 were in the elementary grades (1-6). There were 86 schools, 54 of

which were elementary. The two schools selected had a total enrolment of 745 pupils. There were four grade 6 classes, two in each school, having a combined enrolment of 66 boys and 70 girls.

Subjects. The Ss were 66 grade 6 boys enrolled in two representative schools of District 20, Saint John, N. B. All of the Ss participated in the group testing phase of the experiment. One S transferred out of the district before the individual testing began and a second was away from school because of illness while the PA learning task was being carried out. Three Ss were rejected because they were not able to reach criterion after 40 trials on the training list. One other S was randomly omitted, leaving 60 Ss with 10 in each cell for the analysis of the data.

The Ss ranged in chronological age from 10 years, 10 months to 14 years, 1 month with a mean age of 11 years, 11 months. The CMAS scores ranged from 0 - 30, with a mean of 16.71 and a standard deviation of 7.132 (see Figure 3). (These results are similar to those reported by Castaneda, et al. (1956), using 73 grade 6 boys as Ss, in which a mean CMAS score of 16.58 and a standard deviation of 7.39 were reported.) The distribution of I.Q.'s ranged from 73 to 124, with a mean of 99.18 and a standard deviation of 13.64 (see Figure 4).

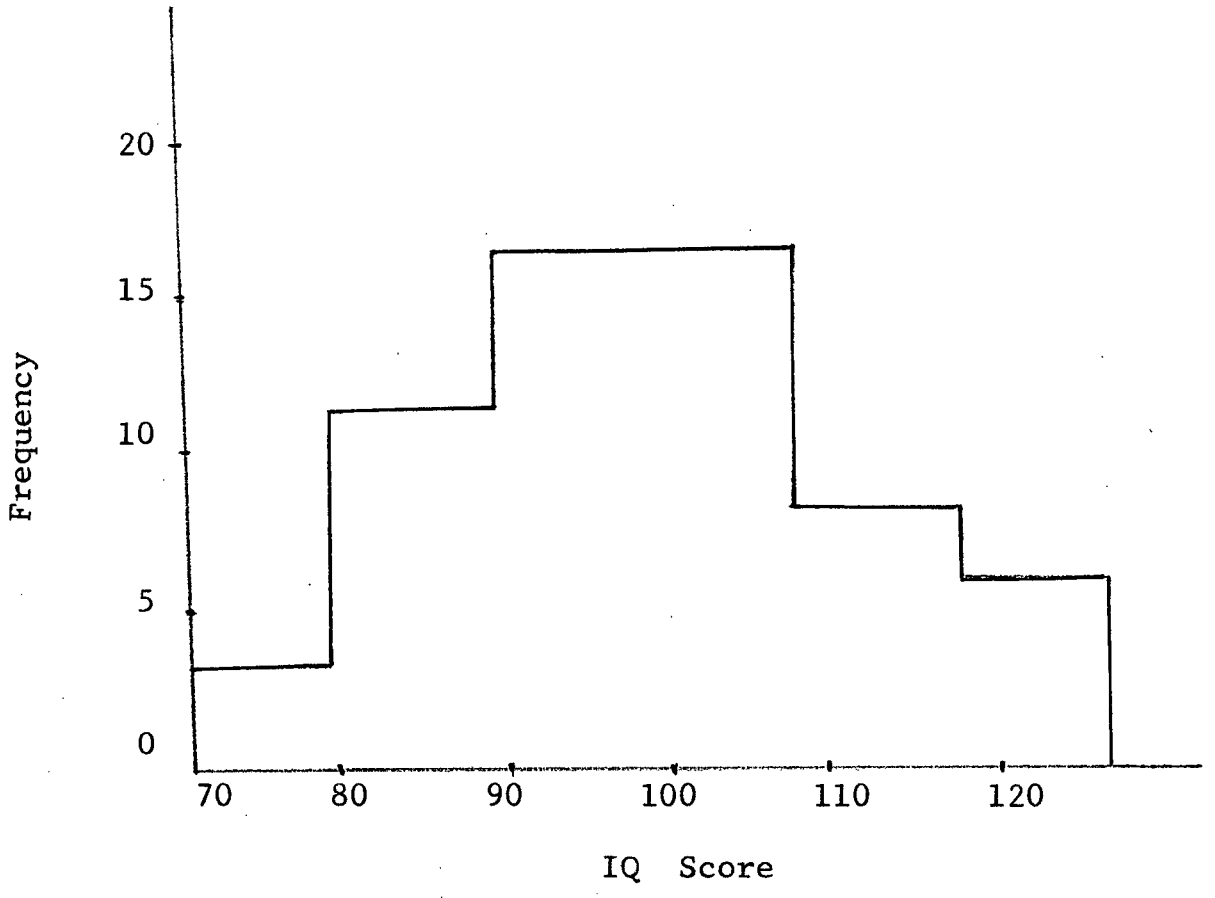

Fig. 4: HNTMA Distribution

Mean - 99.18 Standard Deviation - 13.64

Materials. Three PA lists were constructed with 8 pairs of terms in each list as shown in Table 1. List 1 (A-B) and List 2 (D-B) are the training lists, while List 3 (A-C) is the test list. List 1 (A-B) was administered only to Ss in the experimental group. List 2 (D-B) was administered only to Ss in the control group. List 3 (A-C) was administered to all Ss. List 1 (A-B) and List 2 (D-B) have the same response term (B) but have different stimulus terms (A vs. D). Since the response terms are the same and the stimulus terms have been equated for meaningfulness and concreteness (Paivio, et al., 1968), the assumption was made that the two lists are equally difficult for the experimental and control groups.

List 3 (A-C) has the same stimulus (A) but has a different response term (B vs. C) than List 1 (A-B). It was assumed that using different response terms with the same stimulus should result in competition at the associative-stage and hence the prediction of differential performance between high, medium and low anxious Ss. Since List 3 (A-C) has a different stimulus and response term than List 2 (D-B), there should be no competition at the associative-stage of learning for Ss in the control group.

The stimulus terms are independent, four-letter nouns, rated high in meaningfulness and concreteness in a

TABLE 1

LISTS OF PAIRED-ASSOCIATES

Training Lists		Test List
List 1 - A-B	List 2 - D-B	List 3 - A-C
Army - 14	Camp - 50	Army - 36
Baby - 15	Hall - 98	Baby - 64
Chin - 69	Kiss - 15	Chin - 90
Door - 50	Mast - 60	Door - 16
Gift - 98	Pipe - 22	Gift - 49
Oven - 60	Star - 69	Oven - 95
Rock - 22	Tree - 14	Rock - 21
Wife - 75	Wine - 75	Wife - 12

study by Paivio, Yuille, and Madigan (Paivio, et al., 1968), as can be seen in Table 2. When using highly familiar, but independent, concrete material as stimuli, the assumption is made that in the control paradigm (D-B, A-C), there should be no adverse effects of competition due to interlist similarity between the training (D-B) and the test list (A-C).

The response terms are two-digit numbers chosen from a pool of numbers with close association values, as reported in a study by Battig and Spera (Battig, et al., 1962), as shown in Table 3. The use of this highly familiar material as response terms, which should be already in the Ss' repertoire, was to assure that facilitation for high anxious Ss during the response learning stage was minimal.

The stimulus and response terms were printed on one side with the stimulus term alone on the other side of a 4 by 6 index card. The printing was done by using a Letraset Printpak in order to transfer 3/4" solid, black, capital letters to the index cards. The use of the Letraset printing material was to establish uniform printing on all of the index cards. On the bottom, right hand side of the card with the stimulus-response term shown, a tab one inch in length was attached for convenience in handling.

A three by five foot piece of plywood, with attached supports was used as a screen between the subject

TABLE 2

MEAN SCORES ON MEANINGFULNESS
AND CONCRETENESS OF STIMULI BASED
ON STUDY BY PAIVIO, YUILLE AND MADIGAN (1968)

List 1 - Experimental (A-B)			List 2 - Control (D-B)		
Word	Concrete-ness	Meaning-fulness	Word	Concrete-ness	Meaning-fulness
Army	6.55	6.88	Camp	6.56	7.17
Baby	6.90	7.04	Hall	6.72	6.16
Chin	6.96	5.28	Kiss	6.13	6.68
Door	7.00	7.96	Mast	6.96	7.12
Gift	5.95	7.04	Pipe	6.90	6.20
Oven	6.96	8.08	Star	6.73	7.04
Rock	6.96	5.96	Tree	7.00	6.79
Wife	6.52	6.48	Wine	6.96	7.54
Total	53.80	54.72	Total	53.96	54.70
Mean	6.73	6.84	Mean	6.75	6.84

TABLE 3

MEAN ASSOCIATION VALUES OF TWO DIGIT NUMBERS BASED ON A STUDY BY BATTIG AND SPERA (1962)

Lists 1 and 2 Experimental (A-B) and Control (D-B)		List 3 Test List (A-C)	
Number	Association Value	Number	Association Value
14	2.06	36	2.13
15	2.25	64	2.07
69	2.32	90	2.05
50	2.69	16	2.72
98	2.32	49	2.07
60	2.14	95	1.99
22	2.18	21	3.03
75	2.43	12	2.43
Total	18.39	Total	18.49
Mean	2.30	Mean	2.31

and the experimenter. The screen had a four by six inch opening in the centre in order to display the index cards. A metronome was also used to help the examiner time the exact presentation rate of each card.

Protocol sheets were designed in order to record Ss' responses, as well as their CMAS and HNTMA Scores (see Appendices 4,5,6).

Procedure for the group testing. The CMAS was administered on a group basis by the home room teacher in each of the four classes involved in the experiment. Prior to the testing, an instructional period was held with the teachers. During this session, the teachers were shown a copy of the CMAS and were told that the only instructions read to the class were those that appeared on the test itself. The instructions were: "Read each question carefully. Put a circle around the word Yes if you think it is true about you. Put a circle around the word No if you think it is not true about you."

The HNTMA was administered by the guidance counsellor in one school and the principal in the other school. The home room teachers acted as assistants. Both the principal and the guidance counsellor were experienced in administering group IQ tests.

Procedure for the PA task: The S was first told, upon entering the testing room, that he was participating

in a learning experiment and that it was important that he try his hardest in order to do well. He was then read standard PA instructions (see Appendix 7). After the S indicated that he was ready to begin, one practice trial was held on either the A-B training list if he were in the experimental group or on the D-B training list if he were in the control group. In the practice trial, the side of the index card containing the stimulus and response terms, was held up to the rectangular opening in the screen for exactly three seconds. After the eight cards had been exposed, they were shuffled and then presented one at a time. The anticipation method with a 3:3 presentation rate was employed. The side of the card containing the stimulus was shown to the S for exactly three seconds. It was during this interval that the S was expected to say the number which he thought went with the exposed stimulus. The card was then turned over to the other side containing the stimulus and response for the same period of time. After the presentation of each list, before the beginning of a new trial, the cards were shuffled so that they would be presented in random order. The intertrial interval was 4 seconds.

Ss learned the training list (A-B or D-B) to a criterion of two consecutive, errorless trials, before proceding to the test list (A-C). The only difference

between the procedure employed in the training lists and that employed in the test list, was that all Ss were run to at least 12 trials, even if they had reached criterion prior to the twelfth trial. The interlist interval was 8 seconds.

The experimenter maintained a serious, business-like manner while conducting the individual test in an attempt to maintain moderate stress conditions. It was impossible to get permission to employ more stressful conditions because of the young age of the Ss.

Measuring instruments. The CMAS (Castaneda, et al., 1956, see Appendix 8) is the children's form of Taylor's MAS. The items were originally selected from a group of items of the Minnesota Multiphasic Personality Inventory (MMPI) which were judged to be most representative of the organism's emotional responsiveness as defined by such conditions as; restlessness, distractibility, fatigue, irritability, and psychological and somatic tension. The CMAS consists of 42 items from the MAS judged to be most representative of the anxiety state among children. There are also 11 lie scale items embedded in the body of the CMAS. (Although some studies have excluded children with high lie scale scores, most have made no use of the scale, probably because of the conflicting reports of its value. In the present study, no S made a lie scale score above 5 and none was rejected.)

According to the Taylor-Spence D theory the

hypothetical emotional response, r_e, is aroused by noxious or aversive stimuli, increasing the drive level of the organism. (Spence, 1956; Taylor, 1953). The CMAS is assumed to be the operational measure of individual differences in r_e. Since D is a direct function of r_e, the CMAS is considered to reflect the Ss' D level.

In order to study the construct validity of the CMAS as a measure of the Taylor-Spence D theory, many studies have investigated the effects of anxiety upon simple and complex learning tasks in children. Castaneda, et al. (1956) investigated the performance of grade 5 children on a learning task made up of five components of varying difficulty. The results indicated that the children's performance was a function of anxiety level. In this regard, there was a significant interaction in which HA Ss' performance was inferior on the most difficult components, but superior on the easiest components of the learning task. The results were interpreted as support for the CMAS as a measure of the drive-related construct, r_e.

Further evidence of the construct validity of the CMAS as a measure of D has been reported by Castaneda (1961). Ss were required to learn a criterion task made up of a series of button-lamp combinations. If the correct button was pressed within four seconds, a lamp previously activated was shut off. The dominant response was compatible with the to-be-learned response for one half of the combinations and

incompatible for the other half. High anxious Ss' performance was superior to that of low anxious Ss' when the dominant response was compatible with the to-be-learned response, and inferior when the dominant response was incompatible with the to-be-learned response.

Although the CMAS was originally developed to predict children's D level in learning studies, many investigations have examined its validity as a measure of clinical anxiety. Kitano (1960) made the assumption that behavioural problem children have more anxiety than normal children and that the CMAS would discriminate between the two groups. The significantly higher CMAS scores of the children in the adjustment classes over regular class children, was cited as evidence of the validity of the CMAS as a measure of clinical anxiety. (An interesting aspect of this investigation, is that a Kuder-Richardson reliability coefficient of .86 was reported. This indicates that for this study, the CMAS had very good internal consistency, with a high level of homogeneity of item content.)

Further evidence of the reliability of the CMAS was reported by Levitt (1957). In this study, a Kuder Richardson $(KR)_{20}$ (generalized) reliability coefficient of .89 was reported on the anxiety scale and .65 on the lie scale. Hoyt's analysis of variance was used in order to determine the coefficient. The high KR_{20} coefficient on

the anxiety scale gives an indication that it is representative of the domain from which the items were chosen.

The other measuring instrument incorporated in the design is the HNTMA. It was decided to ascertain the correlation between anxiety and intelligence for the Ss in the sample because of the equivocal research findings concerning the relationship of these two variables. (However, as explained earlier, after it was determined that there was no relationship between anxiety and intelligence for the Ss in the sample, it was assumed that the CMAS would do the job and that it was not necessary to separately control for intelligence.)

One of the main reasons for choosing the HNTMA was because of the wealth and quality of the normative data available for grade 6 pupils. In this regard, the authors of the HNTMA clearly defined the population on which the norms are based, and selected the norming sample in a way so as to make it possible to arrive at an estimate of the sampling error. Two other factors instrumental in the choice of the HNTMA were its high emphasis on verbal abilities, and its ease in administration.

Evidence of the concurrent validity of the HNTMA is indicated by the high correlation coefficients between it and other well established mental ability tests, such as the SRA Primary Mental Abilities (.825) and the California

Test of Mental Maturity (.772). Further evidence of concurrent validity are the moderate to reasonably high correlation coefficients between the HNTMA and school achievement as measured by the Iowa Test of Basic Skills (.574 - .730).

The HNTMA manual reports very high reliability on two studies using grade 6 Ss. Odd-even reliability coefficients of .955 and .934 on Form A and Form B respectively, give evidence of excellent internal consistency for the instrument in the first study. High equivalence reliability is indicated in the second study with alternate forms correlation coefficients of .865 when Form A was administered first and .899 when Form B was administered first.

CHAPTER III - THE RESULTS

The total number of errors made by each S per trial was defined as the dependent variable in the main statistical analysis. The error measure was used instead of number of trials required to reach criterion, because it has been identified as a more sensitive measure of treatment effects than is the trial measure.

The results were analyzed over six trials on both the training list (A-B or D-B) and the test list (A-C). It was assumed that any further analysis would be confounded by the rapidly increasing proportion of Ss with errorless trials beyond the sixth trial.

A two (experimental conditions) by three (anxiety levels) by six (repeated trials) analysis of variance was performed on the mean number of errors given on the training list (A-B or D-B) and the test list (A-C). For the purpose of the analysis, Ss (10 per cell) is assumed to be a random factor, while the others are fixed.

The mean number of errors on the training list (A-B or D-B), is shown in Table 4. They are 4.66, 4.21, 3.31 in the experimental group, and 4.88, 4.15, 3.51 in the control group for HA, MA and LA Ss respectively. The summary of the analysis of variance, as can be seen in Table 5, shows that there is no significant difference in performance

TABLE 4

MEAN NUMBER OF
ERRORS ON TRAINING LISTS (A-B,D-B)
PER TRIAL

	Exp. (A-B)	Control (D-B)
HA	4.66	4.88
MA	4.21	4.15
LA	3.31	3.51

TABLE 5

SUMMARY OF THE ANALYSIS OF
VARIANCE OF THE MEAN NUMBER OF ERRORS
PER TRIAL ON THE TRAINING LIST (A-B OR D-B)

Source of Variation	df	Mean Square	F
Exp., Control (L)	1	1.22	.07
Anxiety (K)	2	55.65	3.62*
L x K Interaction	2	.75	.04
Error - Ss w. LK groups	54	15.35	-
Trials (I)	5	93.85	88.01**
L x I Interaction	5	1.75	1.64
K x I Interaction	10	1.30	1.22
L x K x I Interaction	10	1.11	1.04
Error - I x Ss w. groups	270	1.06	-

* $p < .05$
** $p < .0005$

between experimental and control groups. This indicates that the training list (A-B or D-B) is equally difficult, as assumed earlier, for Ss in the experimental and control groups respectively.

There is a significant difference in the main effect of anxiety on the training list (A-B or D-B), F (2,54) = 3.62, $p < .05$, as shown in Table 5. Table 4 indicates that HA Ss performance is inferior to MA Ss' and MA Ss' inferior to LA Ss' in both the control and experimental groups. In this regard, a comparison was made between all pairs of means using the Tukey HSD (honestly significant difference) test with an α level of .01. HA Ss' performance is significantly inferior to LA Ss' in both experimental and control groups, but there is no significant difference in performance between any other pairs of means. Although this result was not expected, it seems to indicate that fairly high stress conditions might be present in the early stages of PA learning, resulting in HA Ss having much more initial difficulty coping with the novel task than did MA Ss and LA Ss.

The only other significant difference on the training list (A-B or D-B) is the expected improvement in performance by all Ss as the trials progressed, F (5,270) = 88.01, $p < .0005$.

A preliminary two-way analysis of variance on the training lists (A-B, D-B), using total errors to criterion

as the dependent variable, gives essentially the same results as observed in terms of the number of errors per trial. Table 6 shows that the mean number of errors to criterion are 49.10, 39.70, and 27.80 in the experimental group and 46.80, 42.40, and 30.20 in the control group for HA, MA and LA Ss respectively. It can be seen in Table 7 that there is no significant main effect due to experimental conditions, but that there is one due to anxiety, F (2,54) = 3.97, $p < .05$. There is no significant interaction.

The mean number of errors on the test list (A-C) for the experimental and control groups, with total errors per trial as the dependent variable, is shown in Table 8. They are 4.40, 4.56, and 4.03 in the experimental group and 2.80, 2.88, and 3.33 in the control group for HA, MA and LA Ss respectively.

As can be seen in the main analysis of variance summary shown in Table 9, there is a significant difference in the main effect between experimental and control groups, F (1,54) = 15.19, $p < .0005$. This supports the hypothesis that performance by the experimental group would be inferior to performance by the control group on the test list (A-C). This confirmation of the inhibitory effects of test list (A-C) learning for the experimental group, presumably due to competition in the experimental paradigm (A-B, A-C), is a necessary condition before testing the hypotheses derived from the Taylor-Spence D theory.

TABLE 6

MEAN TOTAL NUMBER OF

ERRORS ON TRAINING LIST (A-B OR D-B)

	Exp. (A-B)	Control (D-B)
HA	49.10	46.80
MA	39.70	42.40
LA	27.80	30.20

TABLE 7

SUMMARY OF THE ANALYSIS
OF VARIANCE ON THE MEAN TOTAL NUMBER
OF ERRORS ON THE TRAINING LIST (A-B OR D-B)

Source of Variation	*df*	Mean Square	*F*
Exp.,Control (A)	1	13.06	0.03
Anxiety (B)	2	1839.7	3.97*
Interaction (AxB)	2	39.31	0.08
Error	54	463.26	

* $p < .05$

TABLE 8

MEAN NUMBER OF ERRORS PER TRIAL ON
THE TEST LIST (A-C) BY EXPERIMENTAL CONDITIONS

	Exp.	Control
HA	4.40	2.80
MA	4.56	2.88
LA	4.03	3.33

TABLE 9

SUMMARY OF THE ANALYSIS
OF VARIANCE OF THE MEAN NUMBER OF ERRORS
PER TRIAL ON THE TEST LIST (A-C)

Source of Variation	df	Mean Square	F
Exp., Control (L)	1	158.66	15.19*
Anxiety (K)	2	.48	0.04
L x K Interaction	2	8.91	0.85
Error - Ss w. LK groups	54	10.44	-
Trials (I)	5	114.12	93.47*
L x I Interaction	5	2.34	1.91
K x I Interaction	10	2.02	1.66
L x K x I Interaction	10	.98	0.80
Error - I x Ss w. groups	270	1.22	-

* $p < .0005$

The only other significant difference on the test list (A-C) is the expected improvement in performance by all Ss as the trials progressed, F (5,270) = 93.47, $p < .0005$.

The interaction between the paradigmic variable (i.e., the experimental vs. the control condition) and the three levels of anxiety on the test list (A-C) is not significant, F (2,54) $\leq$ 1.0 as shown in Table 9. It was expected that HA Ss' performance in the experimental group on the test list (A-C) would suffer differentially more from response competition than MA Ss' and MA Ss' would, in turn suffer more than LA Ss'. Although this interaction is not significant the observed mean performance scores appear to be in the expected direction, as can be seen in Figure 5.

There is no significant main effect on the test list (A-C) due to anxiety, as can be seen in Table 9, F (2,54) $\leq$ 1.00 and no interaction, as indicated in the preceeding paragraph, between experimental and control groups and the three levels of anxiety. Thus, there is no support for the hypotheses that HA Ss' performance on the test list (A-C) would be inferior to MA Ss' and LA Ss' in the experimental group, but superior on the test list (A-C) to MA Ss' and LA Ss' in the control group. However, the direction of the predictions is again favourable to the hypotheses, although not significant.

The interaction between anxiety levels and trials is nearly significant at the .05 level, F (10,270) = 1.66,

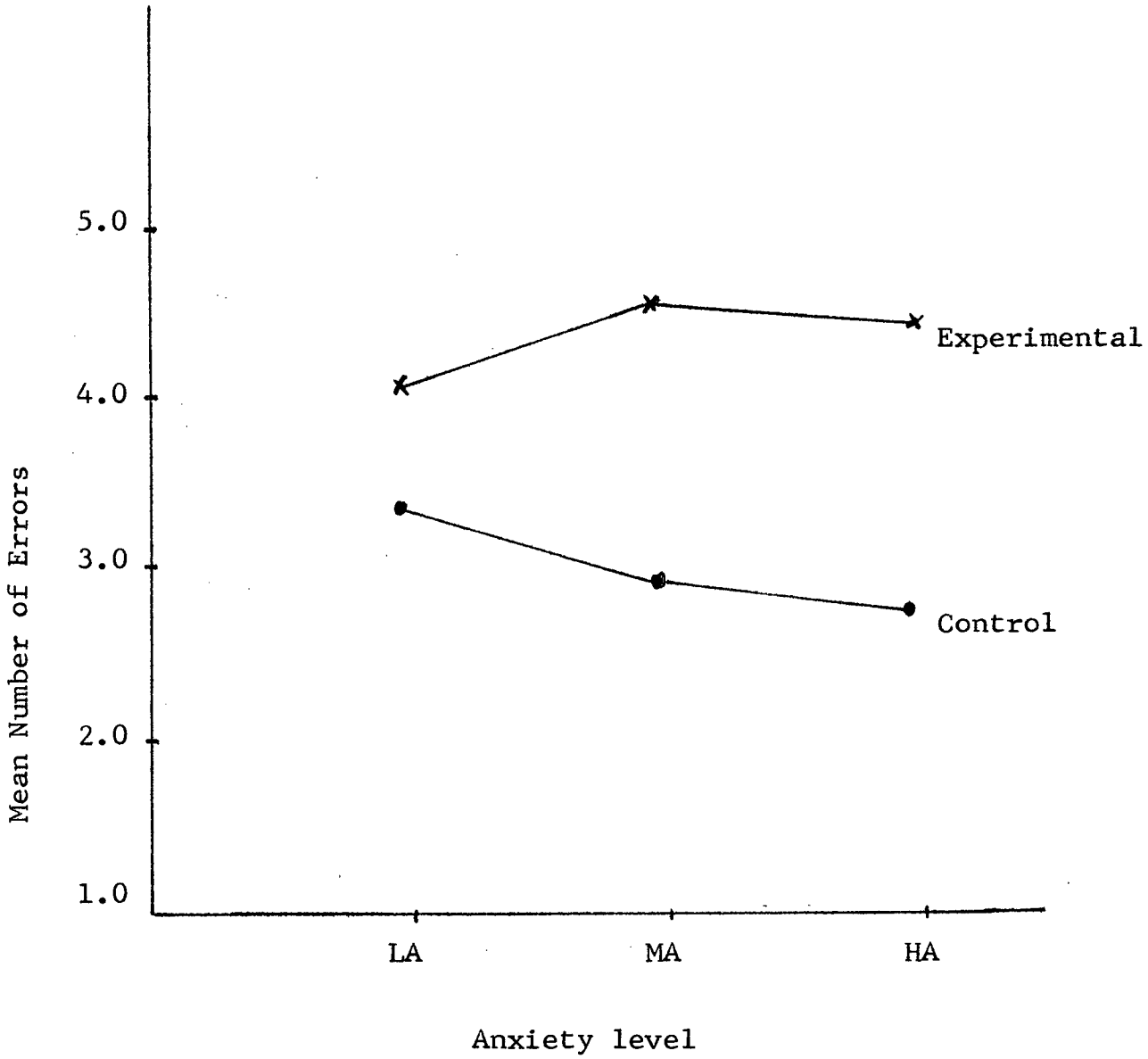

Fig. 5: Mean Number of Errors per Trial by Experimental Conditions

$p < .10$, as shown in Figure 6. The graph showing mean number of errors per trial on the test list (A-C) in the experimental group suggests that HA Ss' performance is inferior to MA Ss' in the second, third and fourth trials, but superior in the fifth and sixth trials as can be seen in Figure 6. These results were expected since associative-stage competition with its resulting inhibitory effects, especially for HA Ss, should be maximal in the earlier and minimal in the later stages of learning. However, there are no other reversals in performance on the test list (A-C) in the experimental group, and hence there is no further support for the interaction between anxiety levels and trials.

The graph showing the mean number of errors on the test list (A-C) in the control group, does not show any distinct pattern between the performance curves for the three levels of anxiety (see Figure 6). These results were expected since there should be minimal associative-stage competition in the control paradigm (D-B,A-C).

The two other nonsignificant interactions on the test list (A-C), as can be seen in Table 9, are experimental conditions and trials; and experimental conditions, anxiety and trials.

The preliminary two-way analysis of variance on the test list (A-C), using total errors to criterion as the

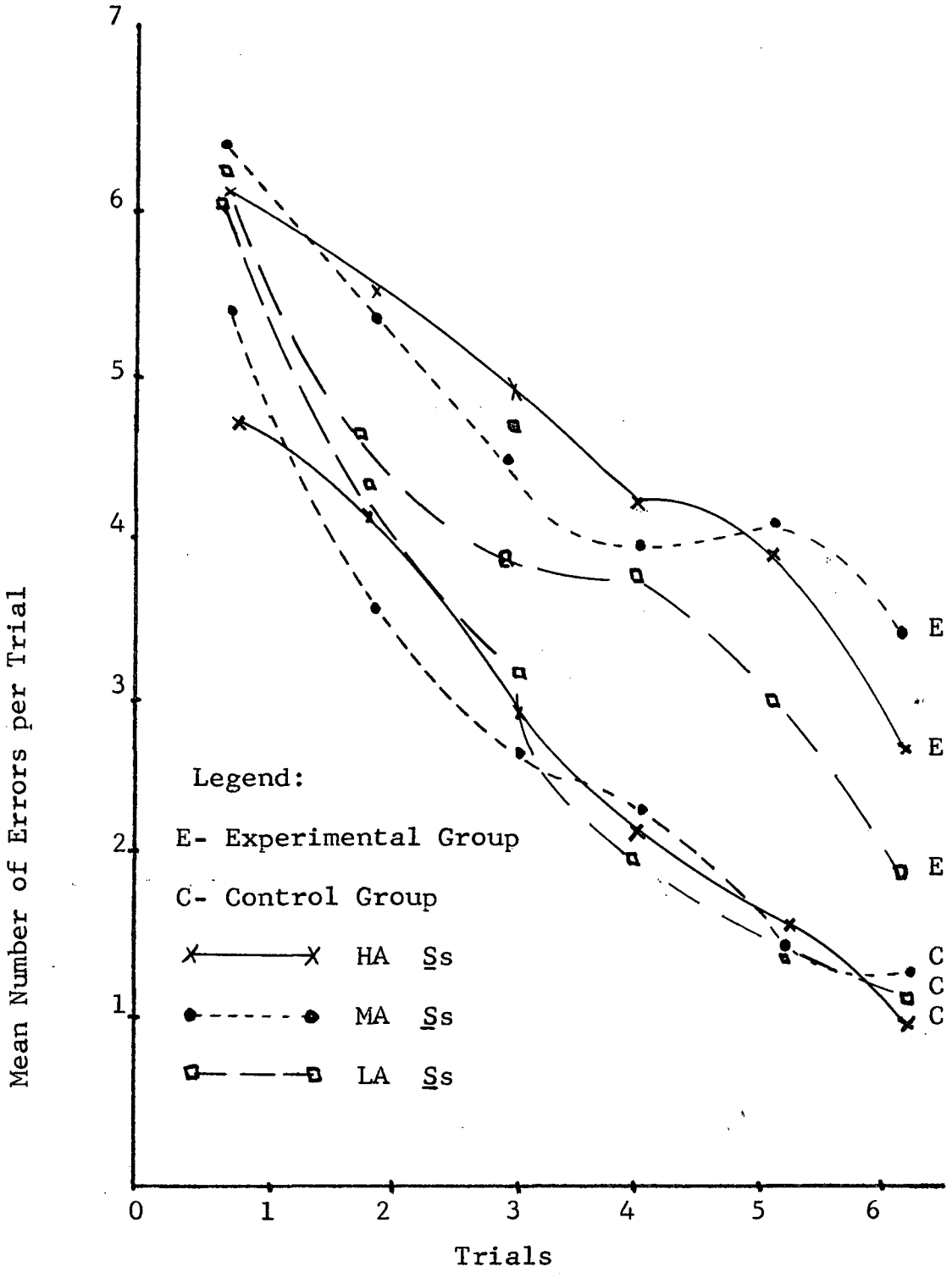

Fig. 6: Mean Number of Errors per Trial Made by the Experimental and Control Conditions Over Trials

dependent variable, gives essentially the same results as yielded by the previous analysis. Table 10 shows that the mean number of errors to criterion are 47.70, 45.60, and 35.10 in the experimental group and 20.80, 22.80, and 24.80 in the control group for HA, MA and LA Ss respectively. Table 11 indicates that there is a significant main effect due to experimental conditions, F (1,54) $p < .0005$, but none due to anxiety. There is no significant interaction between anxiety and experimental conditions. However, there is a trend favourable to the interaction hypothesis as the observed mean performance scores shown in Table 10 are in the expected direction.

TABLE 10

MEAN TOTAL NUMBER OF

ERRORS ON THE TEST LIST (A-C)

	Exp. (A-B)	Control (D-B)
HA	47.70	20.80
MA	45.60	22.80
LA	35.10	24.80

TABLE 11

SUMMARY OF THE ANALYSIS
OF VARIANCE OF THE MEAN TOTAL NUMBER
OF ERRORS ON THE TEST LIST (A-C)

Source of Variation	*df*	Mean Square	*F*
Exp.,Control (A)	1	6000.00	16.44*
Anxiety (B)	2	121.85	0.33
Interaction(AxB)	2	373.85	1.02
Error	54	364.97	

* $p < .0005$

CHAPTER IV - THE DISCUSSION

The results from the present study are generally not favourable to the Taylor-Spence theory of emotionally based drive (D), as reflected by scores on the CMAS. Most of the predictions are in the right direction, but chance factors alone could have accounted for this since none of the hypotheses generated from the theory is supported at the .05 significance level.

The attainment of results incompatible with the theory being studied can be discussed in terms of three possible eventualities, as suggested by Cronbach, et al. (1955): (1) the theory is wrong, (2) the test does not measure the theory, or (3) the experimental design failed to provide appropriate conditions for testing the hypotheses correctly.

First of all, the alternative that the Taylor-Spence D theory is wrong cannot be accepted. In the first place, the nomological network which defines the theory has become well established since its origination more than 10 years ago. Although there are still many loose strands in the net, there is no justification for rejecting the theory and destroying the whole network on the basis of the evidence from one study.

A more practical reason for not rejecting the Taylor-Spence D theory is that trends in the sample studied,

although chance factors could have accounted for these, generally favour it. The first favourable trend is that HA and MA Ss' performance tends to be superior to LA Ss' in the control group on the test list (A-C). It is on this list (A-C) in the control group that the facilitating effects of response-stage learning for HA and perhaps MA Ss over LA Ss is assumed to be greater than the debilitating effects of associative-stage competition. There is also some support for the interaction hypothesis in terms of the apparent trends observed in Figure 5. Also, HA Ss' performance appears to be inferior to LA Ss' on the test list (A-C) in the experimental group. This is not incompatible with the Taylor-Spence expectation that the inhibitory effects of associative-stage competition would retard learning more for HA Ss than for MA and/or LA Ss.

The fact that there is no significant simple effect due to the anxiety levels in terms of the test list (A-C) given to the experimental group or no significant interaction between the paradigmic variable and the anxiety levels raises a serious question as to the construct validity of the CMAS as a measure of the anxiety trait as postulated by the Taylor-Spence D theory. In this regard, other evidence that questions its construct validity has been reported by Standish, et al. (1960) and Sassenrath, et al. (1964).

A further reason for the attainment of nonsignificant results could be the use of a verbal psychometric test to determine each S's anxiety level. Since the Ss in the present study are young children (mean age 11 years, 11 months), the accuracy of their verbal responses to the CMAS questions becomes a very crucial factor. Further studies introducing a physiological measure of anxiety in the experimental design might help to overcome this difficulty by giving more insight to each S's true anxiety level.

The nonsignificant results observed in the present study can be accounted for by the failure of the experimental design to test the hypotheses correctly as the third alternative. The fact of the significant main effect due to the paradigmic variable indicates that this aspect of the experimental design cannot account for the failure to have observed the reliable interaction between the paradigmic variable and the anxiety levels. However, the type of stress conditions presumably achieved in the present experiment, and the length of the PA list used should be considered.

Spielberger, et al. (1966) reported results favourable to the Taylor-Spence D theory under stress, but not neutral conditions. For this reason, moderate stress conditions were employed, in the individual testing phase of the present experiment, by first telling each S that he was participating in a learning experiment and that it was important that he try his hardest in order to do well.

In an attempt to maintain these conditions, the experiment was conducted in a serious, businesslike manner.

One factor which might have reduced stress conditions was the necessity of telling the Ss that they should not be discouraged by, or afraid of, making mistakes (see Appendix 7). These instructions were given in an attempt to assure that the Ss, especially those making a great number of errors, would not become discouraged and give up during the initial stages of learning. However, there is evidence that the PA instructions given did not interfere with the establishment of moderate stress conditions, at least in the initial stages of learning. Both analyses of the training list (A-B or D-B) indicate a significant main effect of anxiety, with HA Ss' performance inferior to MA Ss' and MA Ss' performance inferior to LA Ss' in both experimental and control groups. Thus, HA Ss in the present study, had more initial difficulty in coping with the PA learning task than did MA Ss and LA Ss, possibly indicating that stress conditions were present during learning of the training list (A-B or D-B). (If no stress conditions were present, then in accordance with the results reported by Spielberger, et al., 1966, there should be no difference in performance among the three levels of anxiety.)

The type of stress conditions employed may also have been influenced by the fact that the experimenter, of necessity, spent a week at a time in each school and as a result, soon became a very familiar, and probably less threatening, figure to most of the pupils. Also, as the week progressed the pupils became more aware of what was expected of them in the testing room, because of hearing their classmates discuss the experiment, and consequently became much less apprehensive about participating in it. (Although Ss were told not to discuss the experiment, some did not follow the instructions.) In fact it did not take the pupils long to realize that going to the testing room gave them an opportunity to get a break from their regular routine and as a result, the teachers were soon flooded with requests from individuals who wished to be chosen as Ss. Thus, it is probable that the type of stress conditions present in the early stages of the PA learning task were moderate, but in the later stages were closer to neutral.

Another factor that may have contributed to the nonsignificant results, as stated earlier, is the number of paired-associates used in the learning task. In choosing an appropriate number, it was necessary to consider the young age of the Ss (mean age 11 years, 11 months) and the wide range of their abilities as measured by the HNTMA (see Figure 4). It was determined from previous pilot work with

children of this age level that many of them had previously acquired more efficient learning habits than others. For such Ss, it was much easier to cope with the PA learning task than for others, even though they were naive to PA learning, resulting for them in more rapid PA acquisition. Thus, in the present study, it was necessary to construct a PA list long enough to detect the effects of competition at the associative-stage in the experimental paradigm (A-B, A-C) for Ss who were able to learn the PA lists very rapidly, and yet still short enough to ensure that it would not result in the rejection of a great number of Ss who were not able to learn the PA lists rapidly. It was concluded, after doing the pilot work, that constructing a list of eight paired-associates should result in the rejection of few Ss (three were eventually rejected), should be long enough to pick up the effects of competition, and yet not be so long as to make fatigue and boredom major factors in test list (A-C) learning. There is evidence that the list was long enough to detect the effects of competition as the main effect of experimental group vs. control group on the test list (A-C) is significant. Thus, by using a list of eight paired-associates, the above ends were probably met, but possibly at the cost of making the list too easy for the Ss who were able to reach the criterion of 2 errorless trials, very early in test list (A-C) learning. In this regard, all

Ss were run to at least 12 trials on the test list (A-C), however, the results were analyzed over only six trials because of the large number of Ss who reached criterion just beyond this trial.

The major implications for future research on the Taylor-Spence D theory, arising out of the present study, center around the establishment of moderate to high stress conditions with grade school children, and further investigation of the construct validity of the CMAS.

The present study may have achieved a higher degree of stress if more threatening instructions had been given to the Ss at the beginning of PA learning. However, because of the young age of the pupils it was impossible to get permission to do this. (Even if it had been possible, there is some doubt that it would have been successful because, as discussed earlier, there were many factors that were outside the experimenter's control.) Future research on the Taylor-Spence D theory, using young children as Ss, could avoid some of these difficulties by arranging to work with each one in a foreign, and consequently more threatening environment, rather than in the familiar, less threatening school setting.

An interesting problem concerning the degree of stress present is that if the Taylor-Spence D theory holds only under stress conditions, then to utilize fully its

motivational or energizing properties an optimum level of stress should be present. Future investigations, manipulating stress levels, should give more insight to this problem.

Another important area which needs further investigation is the construct validity of the CMAS. Cronbach, et al., (1955), point out that the validation of a test should follow the same general pattern and use the same scientific principles as the validation of the theory itself. In this regard, it is necessary to get a clearer picture of what is really meant by the arbitrary division of anxiety into three levels (high, medium, low), as defined by the CMAS. Investigations should be directed towards determining the extent within each category of anxiety to which Ss exhibit certain common characteristics such as similar behavioural patterns. Also, the CMAS should be studied in conjunction with other variables assumed to have high motivational properties, e.g., high stress, noxious stimuli and high need-achievement. It is through these types of investigations that a better understanding of the instrument and, ultimately, of the trait itself should be achieved.

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APPENDIX 1

It is my opinion that Champlain Heights and Bayview are two elementary schools in District 20, City of Saint John, Province of New Brunswick, which are representative of the socio-economic conditions of the community. Both schools draw students from a wide and varying range of social and economic backgrounds.

Travis W. Cushing

Assistant Superintendent

Director of Special Services,
District 20

APPENDIX 2

It is my opinion that Champlain Heights and Bayview are two elementary schools in District 20, City of Saint John, Province of New Brunswick, which are representative of the socio-economic conditions of the community. Both schools draw students from a wide and varying range of social and economic backgrounds.

Arthur L. Pottle
Coordinator of Guidance,
District 20

APPENDIX 3

It is my opinion that Champlain Heights and Bayview are two elementary schools in District 20, City of Saint John, Province of New Brunswick, which are representative of the socio-economic conditions of the community. Both schools draw students from a wide and varying range of social and economic backgrounds.

Kenneth J. Brown
Assistant Superintendent,
Personnel, District 20

APPENDIX 4

RESPONSE PROTOCOL FOR Ss IN THE EXPERIMENTAL GROUP

Ss Name: CMAS Score: HN Score:

List 1 - A-B	Number of Trials																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Army - 14																														
Baby - 15																														
Chin - 69																														
Door - 50																														
Gift - 98																														
Oven - 60																														
Rock - 22																														
Wife - 75																														
Total Errors																														

APPENDIX 5

RESPONSE PROTOCOL FOR Ss IN CONTROL GROUP

Ss Name: CMAS Score: HN Score:

List 2 - D-B	Number of Trials																												
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Camp - 50																														
Hall - 98																														
Kiss - 15																														
Mast - 60																														
Pipe - 22																														
Star - 69																														
Tree - 14																														
Wine - 75																														
Total Errors																														

APPENDIX 6

RESPONSE PROTOCOL FOR TEST LIST DATA

Ss Name: CMAS Score: HNTMA Score:

List 3 - A-C	Number of Trials																													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Army - 36																														
Baby - 64																														
Chin - 90																														
Door - 16																														
Gift - 49																														
Oven - 95																														
Rock - 21																														
Wife - 12																														
Total Errors																														

APPENDIX 7

PAIRED - ASSOCIATES LEARNING INSTRUCTIONS

This is a learning experiment in which you will learn to connect words and numbers. It is important that you understand the instructions. If there is anything that is not clear, please tell me.

Look carefully at the example card that I am holding up to the window in this screen. On one side, there is a word and a number. On the second side, there is the same word, but not the number. In future, it will be your job to connect the word with its right number for a list made up of eight cards similar to this example card.

When we begin showing the cards, you will see the side which has a word and number on it for the whole list. This will give you a chance to study the right connections between the words and the numbers. After you have been shown the complete list of eight cards, you will then be shown, for three seconds, the side of the card which has only a word on it. It is during this time, that you are expected to say the number which you think goes with the word. After the three seconds are up, the card will be turned over so that you can see the side which has on it both the word and its number. If you are able to say the

APPENDIX 7

PAIRED - ASSOCIATES LEARNING INSTRUCTIONS - continued

correct number before the card is turned over, I will count it as correct; on the other hand, if you say nothing or say the correct answer after the three seconds are up, I will count it as incorrect.

Always try to get as many correct as possible. If you are having trouble thinking of some of the numbers which go with the words, try not to let this discourage you or prevent you from doing the best you can and learning the list as quickly as possible. Since the cards will follow one another in a different order each time, make sure that you learn to connect the word with its number as a pair and not in any special order.

Be sure to call out the numbers loudly enough so that I can hear them clearly. Do not be afraid of making mistakes, as they are to be expected. Are there any questions?

Note: The example card had HOME on one side and HOME - 24 on the other.

APPENDIX 8

Name_____ BOY GIRL (circle one)

Teacher_____ Grade_____

Read each question carefully. Put a circle around the word YES if you think it is true about you. Put a circle around the word NO if you think it is not true about you.

	1. It is hard for me to keep my mind on anything.	YES	NO
	2. I get nervous when someone watches me work.	YES	NO
	3. I feel I have to be best in everything.	YES	NO
	4. I blush easily	YES	NO
*	5. I like everyone I know.	YES	NO
	6. I notice my heart beats very fast sometimes.	YES	NO
	7. At times I feel like shouting.	YES	NO
	8. I wish I could be very far from here.	YES	NO
	9. Others seem to do things easier than I can.	YES	NO
*	10. I would rather win than lose in a game.	YES	NO
	11. I am secretly afraid of a lot of things.	YES	NO
	12. I feel that others do not like the way I do things.	YES	NO

APPENDIX 8 - continued

	13.	I feel alone even when there are people around me.	YES	NO
	14.	I have trouble making up my mind.	YES	NO
	15.	I get nervous when things do not go the right way for me.	YES	NO
	16.	I worry most of the time.	YES	NO
*	17.	I am always kind.	YES	NO
	18.	I worry about what my parents will say to me.	YES	NO
	19.	Often I have trouble getting my breath.	YES	NO
	20.	I get angry easily.	YES	NO
*	21.	I always have good manners.	YES	NO
	22.	My hands feel sweaty.	YES	NO
	23.	I have to go to the toilet more than most people.	YES	NO
	24.	Other children are happier than I.	YES	NO
	25.	I worry about what other people think about me.	YES	NO
	26.	I have trouble swallowing.	YES	NO
	27.	I have worried about things that did not really make any difference later.	YES	NO
	28.	My feelings get hurt easily.	YES	NO
	29.	I worry about doing the right things.	YES	NO
*	30.	I am always good.	YES	NO
	31.	I worry about what is going to happen.	YES	NO
	32.	It is hard for me to go to sleep at night.	YES	NO

APPENDIX 8 - continued

	33.	I worry about how well I am doing in school.	YES	NO
*	34.	I am always nice to everyone.	YES	NO
	35.	My feelings get hurt easily when I am scolded.	YES	NO
*	36.	I tell the truth every single time.	YES	NO
	37.	I often get lonesome when I am with people.	YES	NO
	38.	I feel someone will tell me I do things the wrong way.	YES	NO
	39.	I am afraid of the dark.	YES	NO
	40.	It is hard for me to keep my mind on my school work.	YES	NO
*	41.	I never get angry.	YES	NO
	42.	Often I feel sick in my stomach.	YES	NO
	43.	I worry when I go to bed at night.	YES	NO
	44.	I often do things I wish I had never done.	YES	NO
	45.	I get headaches.	YES	NO
	46.	I often worry about what could happen to my parents.	YES	NO
*	47.	I never say things I shouldn't.	YES	NO
	48.	I get tired easily.	YES	NO
*	49.	It is good to get high grades in school.	YES	NO
	50.	I have bad dreams.	YES	NO
	51.	I am nervous.	YES	NO
*	52.	I never lie.	YES	NO
	53.	I often worry about something bad happening to me.	YES	NO

* Lie scale items