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Lewis R. Waid

RELATIONSHIPS OF STATE-TRAIT ANXIETY AND TYPE OF PRACTICE TO READING COMPREHENSION OF COLLEGE STUDENTS

LEWIS R. WAID

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Running head: State-Trait Anxiety

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LEWIS R. WAID

Approved:

Dr. Kenneth A. Blick

Dr. William E. Walker

Dr. Matt E. Jaremko

Abstract

Sixty male and female college students of average scholastic aptitude, 30 with high A-trait and 30 with low A-trait, were tested for reading comprehension following either massed (MP) or distributed practice (DP) with narrative reading material. Twice during the experiment the students' A-state was assessed through Spielberger's STAI A-state scale. The findings demonstrated; (a) high A-trait students responded to the experimental situation with greater elevations in A-state; (b) performance on the reading comprehension task was related to A-trait level with low A-trait students performing significantly better; (c) the A-state level of the students immediately prior to the reading comprehension test was a good predictor of performance with students of low A-state performing significantly better than high A-state students. The hypothesis that type of practice would have a differential effect on performance for students who differ in anxiety level was not confirmed, however; DP was found to significantly reduce the A-state level of high A-trait students. These findings were compared with the results of previous research on Spielberger's state-trait theory of anxiety and ideas for future research are discussed.

Relationships of State-Trait Anxiety and Type of Practice to Reading Comprehension of College Students

The Taylor-Spence (Spence & Spence, 1966) drive interpretation of anxiety has led to a variety of experiments on the effect of anxiety on learning. Many of these studies have utilized the Taylor (1953) Manifest Anxiety Scale (TMAS) to measure the anxiety level of their subjects. The assumption was that differences in level of anxiety would reflect differences in emotional responsiveness and, hence, drive.

While the drive interpretation of anxiety has successfully predicted human behavior in classical conditioning (Spence, 1964) and serial and paired-associate verbal learning (Spielberger, 1966; Goulet, 1968), it has also led to negative results (Maltzman, Eisman, & Morrisett, 1961; Pyke & Agnew, 1963; Spielberger & Smith, 1966). This brought into question either or both the usefulness of the theory or the adequacy of the tests of the theory.

Investigations of learning under neutral and stressful experimental conditions helped clarify these conflicting results by providing strong empirical support (Sarason, 1960; Spielberger, 1966A; Spence & Spence, 1966) for what Spence (1958) termed the "reactive hypothesis". The "reactive hypothesis" posited that differences in performance of subjects who differed in anxiety as measured by scales such as the

TMAS would be obtained only when the experimental conditions involved some form of psychological stress. For example, Spielberger and Smith (1966) found a complex relationship between anxiety and performance on their serial verbal learning task when it was given with stressful instructions, but no relationship with neutral conditions.

In an attempt to better conceptually define anxiety and to clarify the conflicting results in anxiety research, Spielberger (1966; 1972) postulated the state-trait theory of anxiety. State anxiety (A-state) refers to a transistory state or condition that is characterized by feelings of tension and apprehension and heightened autonomic nervous system activity; whereas trait anxiety (A-trait) implies individual differences in anxiety proneness, that is, the disposition to respond with elevations in A-state under conditions that are characterized by some threat to self-esteem.

Spielberger (Spielberger, 1966; Spielberger, Lushene, & McAdoo, 1971) has pointed out that the TMAS seems to measure trait anxiety, while the concept of drive is logically more closely associated with state anxiety. Therefore, it would be expected that people who differed in trait anxiety would manifest differences in drive level only under circumstances that caused them to respond with differential elevations in state anxiety. Indeed, Spielberger (1972) believes that the

extent to which drive theory has been supported in the research literature is probably due to the fact that in many studies in which subjects were selected on the basis of an A-trait measure like the TMAS, they were also exposed to ego-involving or failure instructions. Such instructions would induce differential levels of A-state in persons who differed in A-trait.

With the construction of the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1968; 1970) to measure state and trait anxiety, research based on this conceptualization has flourished. (Gorsuch, Note 1; Lamb, Note 2; Hodges & Felling, 1970; Auerbach, 1973; Johnsen, Hohn, & Dunbar, 1973). One of the major tasks of this research has been to describe the characteristics of stressor stimuli that evoke differential levels of A-state in persons who differ in A-trait.

In general, these experimental investigations (Lamb, Note 2; Auerbach, Note 3; McAdoo, Note 4) have produced findings that are consistent with Atkinson's (1964) suggestion that fear of failure is a major characteristic of high A-trait people, and with Sarason's (1960) conclusion that ego-involving instructions are more detrimental to the performance of high A-trait subjects than low A-trait subjects (Spence & Spence, 1966; Spielberger, 1962). In Addition, it has been demonstrated that when an individual's personal adequacy is being

evaluated, e.g. taking an "intelligence test", it appears to be especially threatening to high A-trait people (Denny, 1966; Spielberger, 1966b; Spielberger & Smith, 1966). Thus, failure or ego-involving instructions apparently evoke higher levels of A-state intensity in high A-trait subjects than in low A-trait subjects.

However, as studies by Felix (1965) and Auerbach (1973) have demonstrated, "a priori" assumptions regarding the degree of stress produced by conditions are not always correct. The implication of these studies for research on the effects of anxiety on performance is that A-state must be measured in the experimental situation. (Spielberger, 1972)

The value of measuring state anxiety in the experimental situation was demonstrated by O'Neil, Spielberger, and Hansen, (1969) who investigated the effects of A-state on learning mathematical materials that were presented via computer-assisted instruction (CAI). In this study, the STAI was used to measure the A-state of high and low A-trait subjects during the learning task. High A-state students made more errors on the difficult portion of the learning task than low A-state students, but fewer errors on the easier portion of the task. In a follow up study, O'Neil, Hansen, and Spielberger (1969) found essentially the same anxiety-task difficulty interaction. In neither study was the level of A-trait systematically related to performance even though

performance was related to A-state, and A-state was moderately correlated with A-trait.

The effect of anxiety on the academic performance of college students has been an area of concern investigated by several researchers. Spielberger and Katzenmeyer (1959) were one of the first to explore this area when they examined the relationship between academic performance, level of anxiety, and scholastic aptitude in college students. The authors believed that anxiety like any other personality or motivating variable would be most likely to influence the academic performance of students of average ability. Indeed, their study concluded that grades varied inversely with anxiety level only for the average aptitude students. In a more recent investigation, Kanoy and Walker (Note 5) confirmed the work of Spielberger and Katzenmeyer. If the academic environment, with its tests, reports, and term papers, is viewed as a stress producing situation then these studies are consistent with the drive theory literature, i.e. high anxiety - average aptitude students are most affected in stressful situations.

These findings were of a great concern to psychologists. For example, Spielberger (1966) stated that the "loss to society of the full contributions of potentially able students through underachievement and/or academic failure constituted an important mental health problem in education." The obvious

conclusion from these findings was that if the highly anxious average aptitude student desires to improve his academic performance, he will need to eliminate or compensate for his high anxiety level.

Several studies (Spielberger, Weitz, & Denny, 1962; Spielberger & Weitz, 1964) attempted to reduce the debilitating effects of high anxiety through group therapy sessions. The results of these studies demonstrated that the group counseling technique was effective in increasing the academic performance (grade point average) of highly anxious students. However, the group counseling technique has been critisized as not being a practical solution to the problem because of the number of qualified personnel, time, and money that would be necessary to implement such a program. Kanoy, Walker, and Blick (1976) felt a more practical solution to offsetting the debilitating effects of high anxiety could be obtained by considering how a student studies and rehearses the material to be learned.

Following from the studies of Underwood (1961) and Waechter (1967), Kanoy et al. (1976) investigated the possibility that massed and distributed practice have a differential effect in learning an academically related task for average aptitude college students of both low and high anxiety levels.

In their study, Kanoy et al. (1976) utilized TMAS and

CEEB scores to obtain two different groups of average aptitude students; one defined as highly anxious, the other as low in anxiety. These two groups of students were further divided into two additional groups: half receiving massed practice (MP) on the learning task and half receiving distributed practice (DP). Each student was presented the reading material at a controlled rate four times. MP subjects had a five-second pause between presentations, while DP subjects had a two-minute interval. Following the final presentation, students were tested for reading comprehension by multiple-choice questions that were to be answered in response to the reading passage. Contrary to their expectations, the researchers found no differences across all combinations of type of practice, anxiety level, and immediate vs. 24-hour tests.

Possibly one of the major flaws in Kanoy et al., (1976) study was their assumption regarding the degree of stress in their experimental situation. The research literature (Spence & Spence, 1966; Spielberger, 1966b; Spielberger & Smith, 1966) has demonstrated that the performance of high anxiety and low anxiety subjects will not differ in an experimental situation unless it is stressful. In the Kanoy et al. (1976) study, subjects were under no pressure to participate in the experiment and the experimental results had no special significance for them. The researchers did not even attempt to make their experimental situation stressful through induced threat i.e. falsified knowledge of results, ego-involving

instructions, or failure feedback. It also must be remembered that Kanoy et al. (1976) utilized a trait anxiety scale, the TMAS, to measure their subjects' anxiety level, and expected results in accord with drive theory. The study would have benefited from utilizing a state anxiety measure since the research literature has demonstrated that: (a) The concept of drive is more closely associated with state anxiety (Spielberger, 1966; 1972). (b) "A priori" assumptions regarding the degree of stress in an experimental situation are not always correct (Felix, 1965; Auerbach, 1973).

Another experimental flaw that may account for the null results obtained by Kanoy et al. (1976) was the difficulty level of the learning task. From drive theory (Spence & Spence, 1966) differences are expected in performance between high and low A-trait subjects only when the task is difficult, i.e. competing response tendency is stronger than correct response tendency. More recently, Spielberger (1972) has demonstrated that A-state scores (drive level) are higher on difficult programmed materials than easier ones. Reading passages from the Iowa Silent Reading Test served as the learning material in Kanoy et al. (1976) study. However the Iowa Silent Reading Test was designed for advanced high school and college level students, while Kanoy et al. (1976) utilized college sophomores, juniors, and seniors as subjects. It seems quite plausible that the learning task was below the

reading comprehension level of these upper-level students, consequently, the task was easy.

If the experimental setting was not stressful and the learning task was relatively easy for the students then, according to drive theory, the null results obtained by Kanoy et al. (1976) would be expected.

The purpose of the present research was to work from Spielberger's (1966; 1972) state-trait conceptualization of anxiety and re-investigate the effect of massed and distributed practice upon the learning performance (reading comprehension) of high A-trait and low A-trait average aptitude college students. The present investigation utilized ego-involving instructions and a more difficult reading task in an attempt to insure that the experimental setting was stressful.

A second purpose of the present investigation was to determine whether the type of practice (MP or DP) that a student uses in learning the reading material effects his state anxiety level.

Because the present research was working from Spielberger's state-trait conceptualization of anxiety and utilized the STAI, a third and final purpose of this research was to obtain results supportive of the state-trait theory of anxiety. To this end it was hypothesized that: (a) High A-trait students would respond to the experimental situation with greater

elevations in A-state than low A-trait students. (b) A-trait level would be related to performance with the performance of low A-trait students being superior to high A-trait students. (c) The A-state level of the students immediately prior to the performance task would be more strongly related to performance than A-trait, with low A-state students performing significantly better than high A-state students.

Method

Subjects

The psychology classes at the University of Richmond were surveyed to obtain sixty (60) students for the present study. Both male and female college students were used as subjects and their selection as participants in the study was determined by scores on the College Entrance Examination Boards (CEEB) and A-trait scale of the STAI.

Materials

The learning material consisted of a 1,500 word passage on physiological human development. Craig Readers with speed control presented the reading passages at a controled rate. The reading material was followed by a 36-item multiple choice test that assessed one's knowledge of the content of the passage. The results of a pilot study (Johnsen, Hohn, & Dunbar, 1973) with 30 college students demonstrated that there is a 48% error rate on the 36-item multiple-choice test.

The A-state and A-trait scales of the STAI (Spielberger,

Gorsuch, & Lushene, 1970) were used to measure anxiety.

Procedure

Students in all the psychology classes were first administered the A-trait scale of the STAI. Students who scored 45 or more qualified for the high A-trait group, and those who scored 31 or below qualified for the low A-trait group. These scores represent approximately the upper and lower 20% of the distribution norms for trait anxiety scores of college undergraduates (Spielberger et al., 1970). From the total of students who met the criteria for high and low A-trait level, only those with average scholastic aptitude were asked to participate. Average scholastic aptitude was defined as a CEEB total score between the range 1017 to 1132. These two scores form the extreme limits of the middle 33% range of aptitude scores at the University of Richmond (Kanoy et al., 1976).

Those students who met the requirements for both aptitude and anxiety level were asked to voluntarily consent to continue with the experiment. Prior to their decision, these students were asked to sign a consent form (see Appendix A) that informed them that if they do voluntarily continue with the experiment that it will require up to 1½ hours of their time, and that they will be performing on a reading comprehension task. A total of 60 students were utilized. Half of the students met the requirement for low A-trait level, while the other half were utilized on the basis of their high A-trait

level. The anxiety (high A-trait & low A-trait) groups of 30 students were further randomly divided into two additional groups: half receiving massed practice (MP) on the learning task and half receiving distributed practice (DP).

All of the experimental data was collected during individual testing sessions i.e. one session per subject. When each subject arrived at the experimental setting they received high ego-involving instructions. The students in the massed practice (MP) condition received the following taped instructions: "Please read the following passages as they appear on the control reader before you. The passages will be presented at a constant speed and you will be able to read them four consecutive times. Also, several times throughout the experiment you will be asked to respond via paper and pencil to a questionnaire. After you have completed reading the material you will be given a 36-item multiple choice test to answer pertaining to the passages. These questions test your ability to do college level work, that is, we have found that how well one answers these questions is highly correlated to his or her scholastic ability. It is imperative that you make your best effort in learning the passage and in choosing the best response to each question since if you fail to reach a minimum requirement of 80% correct answers, I will have to ask you to return and repeat the study. Therefore, please be sure to answer all questions even if you do not feel completely

certain of your answer in a particular case."

The students in the distributed practice (DP) condition received essentially the same instructions except that they were told that: "The passages will be presented at a constant speed and you will be able to read them four times with a two minute pause between presentations. During the pause, you will be asked to perform the simple task of crossing out the vowels from a sheet of paper containing letters."

Following the high ego-involving instructions, the first of two state anxiety measures was obtained. The STAI A-state scale was administered with standard instructions, i.e. students were asked to indicate how they feel right now, at this moment.

Once the subjects had completed the STAI A-state scale, the presentation of the 1,500 word passage on physiological human development commenced. The reading passages were presented on the Craig Readers at a rate of 200 words per minute, which is the mean rate of reading speed for students at the University of Richmond (Kanoy et al., 1976). The reading passages were presented to each student for four readings. The MP group had a 5-second pause between presentations, while the DP group had a two minute interval.

Immediately following the fourth and final presentation of the reading material, the second state anxiety measure was obtained. The STAI A-state scale was once again adminis-

tered with standard instructions. Upon the completion of the second STAI A-state scale, subjects were administered the 36-item multiple choice test. There was no time limit imposed on this task.

After the students had completed the multiple choice test, they were informed that the experiment had been concluded. However, prior to their departure they were asked to respond to a questionnaire that assessed the effectiveness of the experimental manipulations (see Appendix B). The students then underwent a debriefing interview, (see Appendix C).

Results

To examine the A-state level of the high A-trait and low A-trait students a one-way analysis of variance was performed. The initial STAI A-state measure was the dependent variable. Hartley's F max test revealed homogeneity of variance between the groups, F_{max} (2,29) = 1.64, $p > .05$. The mean STAI A-state scores for the high A-trait and low A-trait groups were 45.33 and 32.86, respectively. The analysis of variance revealed, as predicted, that the high A-trait group was significantly greater in A-state level than the low A-trait group, F (1,58) = 38.37, $p < .001$.

The effect of A-trait level (high vs. low) and type of practice (MP vs. DP) on the students' performance on

the 36-item multiple-choice test was analyzed in a two-factor, fixed-effect model analysis of variance. The number of correct responses to the multiple-choice test served as the dependent variable. Table 1 presents the mean number of correct answers to the multiple-choice test for each of the experimental groups. Hartley's F max test revealed homogeneity of variance between the groups, F_{max} (4,14) = 1.84, $p > .05$.

Insert Table 1 about here

The only significant finding revealed in the analysis of variance was the main effect of trait anxiety level, F (1,56) = 7.39, $p < .05$. Low A-trait students performed significantly better on the multiple-choice test than high A-trait students regardless of the type of practice they utilized in preparing for the test.

To evaluate the relationship between A-state and performance, all 60 students were divided at the median STAI A-state score that was obtained immediately prior to the administering of the multiple-choice test. Thirty students who scored 38 or above on the STAI A-state scale were designated high A-state subjects, those remaining thirty who scored 37 or below were low A-state subjects. A one-way

Table 1

Mean Number of Correct Responses (and Standard Deviations) on Reading Comprehension Test under Massed and Distributed Practice Conditions by College Students with Different Anxiety Levels

	Mean	S.D.
High Trait Anxiety:	16.80	3.45
Massed Practice	16.40	3.36
Distributed Practice	17.20	3.61
Low Trait Anxiety:	19.43	4.10
Massed Practice	20.20	3.57
Distributed Practice	18.66	4.55

analysis of variance was performed, using as the dependent variable the number of correct answers on the multiple-choice test, and the independent variable was A-state level (high vs. low). Hartley's F max test revealed homogeneity of variance between the groups, F_{max} (2, 29) = 1.36, $p > .05$. The analysis of variance revealed, as predicted, that the low A-state students performed significantly better than high A-state students, F (1,58) = 14.45, $p < .01$. The mean number of correct answers to the multiple-choice test for the high A-state and low A-state groups was 16.37 and 19.90, respectively.

Another purpose of the present research was to determine whether the type of practice (MP vs. DP) a student utilizes in learning the reading material has a differential effect on one's state anxiety level. To this end, a three-factor analysis of variance with repeated measures on one factor was performed. The factors were the repeated measures of the A-state level of the students, type of practice, and trait anxiety level. Spielberger et al. (1970) reported that the mean correlation between A-state and A-trait scales under differentially stressful experimental conditions was .30 for females and .47 for males. These correlations are within the range of acceptance for the legitimate application of the above design. The anaysis of variance

revealed a significant three-factor interaction, F (1,56) = 14.22, $P < .05$. It was concluded that the anxiety level X A-state level interaction was different for the different types of practice.

Table 2 presents the mean STAI A-state scores for the four experimental groups. The first column presents the mean scores obtained from the initial STAI A-state measure, while the second column indicates the mean scores obtained from the second administering of the STAI A-state scale.

Insert Table 2 about here

Splitting the design on the two different types of practice, subsequent analysis revealed that the A-trait level X A-state level interaction was significant only for students who underwent distributed practice sessions, F (1, 56) = 15.39, $p < .05$. It was concluded that the A-state level of students who underwent a distributed practice session was different for the two levels of A-trait.

Subsequent analysis revealed that distributed practice had a significant effect on A-state level only for high A-trait students, F (1,56) = 26.17, $p < .05$. High A-trait students who underwent a distributed practice session had significantly reduced their A-state level by the

Table 2

Mean STAI A-state Scores (and Standard Deviations) of College Students with Different Anxiety Levels under Massed and Distributed Practice

	Initial A-state		Second A-state	
	Mean	S.D.	Mean	S.D.
High Trait Anxiety:				
Maseed Practice	43.00	5.98	45.40	7.65
Distributed Practice	47.66	6.91	39.80	10.03
Low Trait Anxiety:				
Massed Practice	32.60	4.95	31.93	5.34
Distributed Practice	33.13	5.89	33.80	7.62

time they were asked to respond to the multiple-choice test. This result is supported by the data that indicates 13 out of 15 (87%) high A-trait distributed practice students demonstrated a reduction in their A-state level prior to taking the multiple-choice test. In comparison, 11 out of 15 (73%) high A-trait massed practice students demonstrated an increase in their A-state level, although this increase was not statistically significant. (see Appendix D for individual data)

Further anaysis of the trait anxiety level X type of practice X state anxiety level interaction also revealed that high A-trait students who underwent a distributed practice session demonstrated a significantly lower level of A-state prior to the taking of the multiple-choice test than high A-trait massed practice students, F (1,56) = 5.81, $p < .05$.

Figure 1 depicts the interaction effect of trait anxiety level and type of practice on the state anxiety level of the college students.

Insert Figure 1 about here

Discussion

In the present study, the three hypotheses formulated from previous research on Spielberger's State-Trait theory

Figure 1

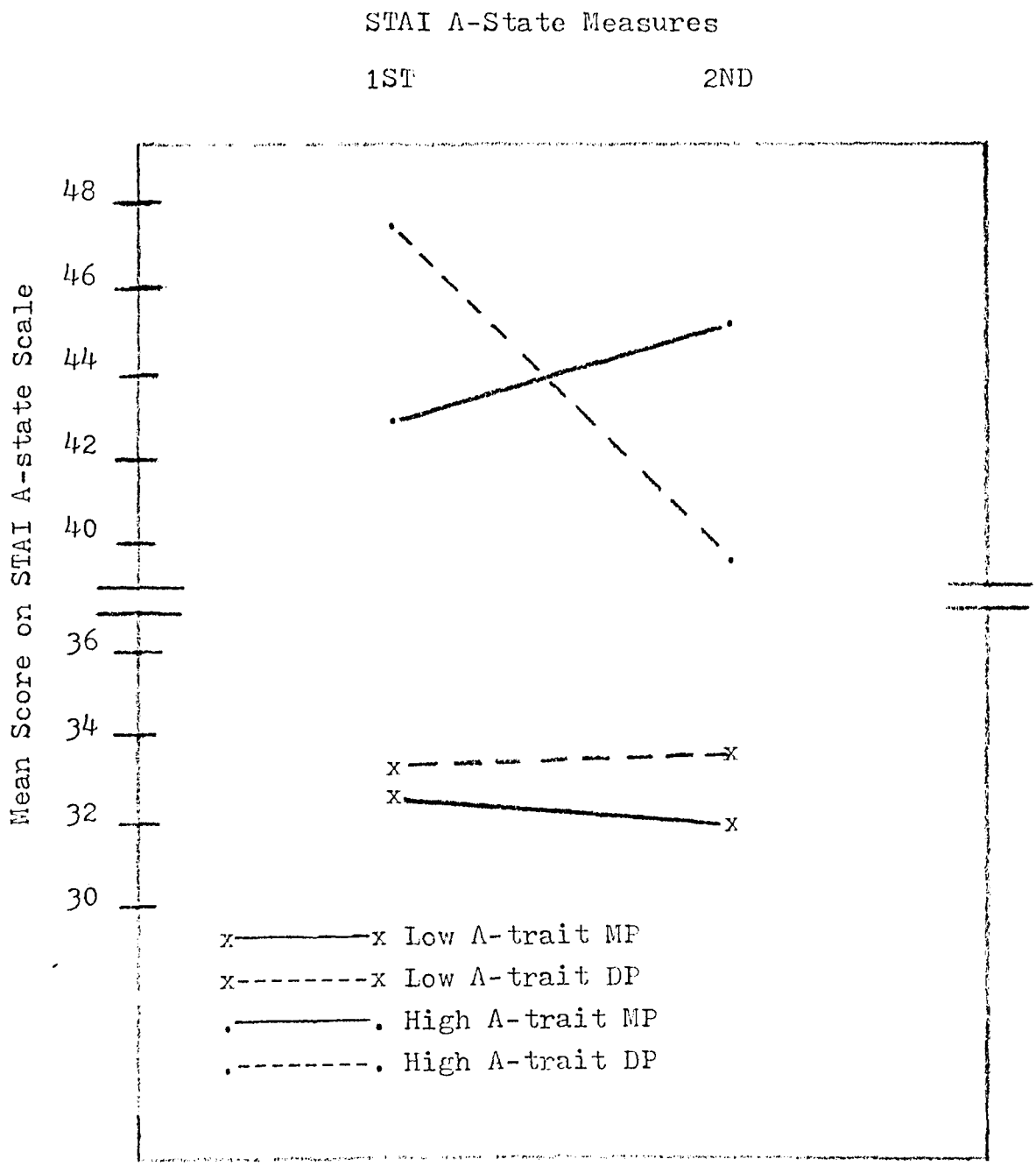

Figure 1. The interaction effect of A-trait level and type of practice on the state anxiety level of college students.

of anxiety received support. As was expected, high A-trait students responded to the experimental situation and the high ego-involving instructions with greater levels of A-state than low A-trait students. The finding is consistent with the research which has demonstrated that when there is a risk of failure, such as academic situations (Mandler & Sarason, 1952; Spielberger, 1962) or when an individual's personal adequacy is being evaluated (Denny, 1966; Spielberger, 1966b; Spielberger & Smith, 1966), it appears to be especially threatening to high A-trait people. The result also concurs with the research that has demonstrated that ego-involving instructions are more detrimental to the performance of high A-trait subjects than low A-trait subjects (Spence & Spence, 1966).

A second hypothesis stating that performance on the multiple-choice test would be related to the trait anxiety level of the students was also confirmed since low A-trait students perfomed significantly better than high A-trait students. However, it is interesting to note that the finding is different from results obtained recently by Spielberger and his colleagues (O'Neil et al., 1969; Hodges & Spielberger, 1969) who found no systematic relationship between A-trait level and performance even though performance was related to A-state, and A-state was moderately correlated with A-trait.

Spielberger (1966; 1972) has pointed out that the

concept of drive) is logically more closely associated with state anxiety, and that people who differ in trait anxiety should manifest differences in drive level only under circumstances that caused them to respond with differential elevations in state anxiety. The present finding of a systematic relationship between A-trait and performance is probably attributable to an experimental situation designed (e.g. high ego-involving instructions, difficult performance task) to evoke differential levels of A-state in students who differ in A-trait.

While the data in the present study demonstrated that the state anxiety level of the students obtained immediately prior to their taking of the multiple-choice test was a good predictor of performance, the hypothesis that the A-state level of the students would be more strongly related to performance than A-trait level was not confirmed. In the present study the relationship between A-state and performance was confirmed in the predicted direction; that is, the performance of high A-state students was inferior to that of low A-state students. The finding is consistent with the recent research that has demonstrated the strong relationship that exists between state anxiety and performance (O'Neil et al., 1969; Hodges & Spielberger, 1969; Meyers & Martin, 1974). The data also supports the Spence interpretation of anxiety as a drive (Spence & Spence, 1966) since the high drive level

associated with higher levels of A-state did lead to the predicted performance decrements in the present study.

Another goal of the present study was to re-investigate the possibility that massed and distributed practice have a differential effect on the learning performance of high A-trait and low A-trait average aptitude college students. The present study found, as did Kanoy et al. (1976), no significant relationship between type of practice, trait anxiety level, and performance.

However, in the analysis of the trait anxiety level X type of practice X state anxiety level interaction, high A-trait students who underwent a distributed practice session demonstrated a significant decrease in their state anxiety level by the time they were ready to take the multiple-choice test. These high A-trait distributed practice students also demonstrated a significantly lower level of A-state than their fellow high A-trait students who underwent a massed practice session. High A-trait massed practice students and low A-trait students demonstrated no significant changes in their A-state level throughout the experiment.

It should be recalled that the present study found the A-state level of students obtained immediately prior to their taking of the multiple-choice test to be a strong predictor of performance. The finding suggest that if a high A-trait student can effectively reduce his A-state prior to

the performance task, he should be able to offset the usual debilitating effects that accompany his high trait anxiety level.

The practical implication of the finding that a distributed practice session leads to a significant reduction in the A-state level of high A-trait students is that there may be ways to control the anxiety provoking aspects of test-like situations by altering the way a student studies and rehearses the material to be learned. A future research design may be to obtain average aptitude, high A-trait students who are apprehensive and nervous (i.e., high A-state) over an upcoming test. The research could have the students carefully plan their study schedule with extended breaks at specific time intervals to determine whether such a planned study schedule results in a reduction of state anxiety and, consequently, improved performance on the task.

Perhaps the critical factor of the distributed practice session which leads to a reduction in the state anxiety of high A-trait students is the planned breaks. These planned breaks may serve as a time when a high A-trait student can relax and gain confidence and reduce his "fear of failure" (Atkinson, 1964) or re-evaluate the threatening aspects of the evaluative situation. More research, of course, is necessary to confirm and to elaborate on the data.

Another implication of the finding that distributed

practice reduces the state anxiety level of high A-trait students is that "a priori" assumptions regarding the degree of stress produced by conditions are not always correct (Felix, 1965; Auerbach, 1973). Thus, the present research supports Spielberger's (1972) contention that A-state must be measured in the experimental situation.

The data reported in the present study indicated that the A-state level of the students immediately prior to their taking of the multiple-choice test was a good predictor of performance. The implication of this finding was that if a high A-trait student effectively reduces his A-state level prior to the performance task, the result should be improved performance on the task. However, the present study failed to find a significant performance difference between high A-trait students who underwent a distributed practice session as compared to those who underwent massed practice, even though they were significantly different in terms of A-state level prior to the multiple-choice test. Therefore, further research is required to determine whether significant reductions in state anxiety do, indeed, result in improved performance. A fruitful research effort would seem to be one which examines the performance of high A-trait average aptitude students who demonstrate a significant reduction in their A-state during the learning trials of an experiment to those who continue

to respond with high elevations of A-state throughout the experiment.

Reference Notes

1. Gorsuch, R. L. Changes in trait anxiety as a function of recent states of anxiety. Unpublished manuscript, George Peabody College for Teachers, 1969.

2. Iamb, D. H. The effects of public speaking on self-report, physiological, and behavioral measures of anxiety. Unpublished manuscript, Florida State University, 1969.

3, Auerbach, S. M. Anxiety and time estimation. Unpublished manuscript, Florida State University, 1969.

4. McAdoo, W. G. The effects of success and failure feedback on A-state for subjects who differ in A-trait. Unpublished manuscript, Florida State University, 1969.

5. Kanoy, R. C., & Walker, W. E. Anxiety and academic achievement: A closer look. Paper presented at the meeting of the Southeastern Psychological Association, New Orleans, March 1976.

References

Atkinson, J. W. An introduction to motivation. Princeton, N.J.: Van Nostrand, 1964.

Auerbach, S. M. Effects of orienting instructions, feedback-information, and trait anxiety level on state-anxiety. Psychological Reports, 1973, 33, 779-786.

Denny, J.P. The effects of anxiety and intelligence on concept formation. In C. D. Spielberger's (Ed.) Anxiety and behavior. New York: Academic Press, 1966, 388-392.

Felix, M. Time estimates as affected by incentive class and motivational level. Genetic Psychology Monographs, 1965, 72, 353-399.

Goulet, L. R. Anxiety (drive) and verbal learning: Implications for research and some methodological considerations. Psychological Bulletin, 1968, 69, 235-247.

Hodges, W. F., & Felling, J. P. Types of stressful situations and their relations to trait anxiety and sex. Journal of Consulting and Clinical Psychology, 1970, 34, 333-337.

Hodges, W. F., & Spielberger, C. D. Digit Span: An indicant of trait or state anxiety? Journal of Consulting and Clinical Psychology, 1969, 33, 430-434.

Johnsen, E. P., Hohn, R. L., & Dunbar, K. R. The relationship of state-trait anxiety and task difficulty to learning from written discourse. Psychonomic Bulletin, 1973, 2, 89-90.

Kanoy, R. C., Walker, W. E., & Blick, K. A. Effect of massed and distributed practice on reading comprehension for high and low anxious college students. Unpublished master's thesis, University of Richmond, 1976.

Maltzman, I., Eisman, E., & Morrisett, L. Rational Learning under manifest and induced anxiety. Psychological Reports, 1961, 8, 357-366.

Mandler, G., & Sarason, S. B. A study of anxiety and learning. Journal of Abnormal and Social Psychology, 1952, 47, 166-173.

Meyers, J., & Martin, R. Relationships of state and trait anxiety to concept-learning performance. Journal of Educational Psychology, 1974, 66, 33-39.

O'Neil, H. F., Hansen, D. N. , & Spielberger, C. D. The effects of state and trait anxiety on computer-assisted learning. In B. A. Maher's (Ed.) Progress in experimental personality research. New York: Academic Press, 1973, 109-146.

O'Neil, H. F., Spielberger, C. D., & Hansen, D.N. The effects of state-anxiety and task difficulty on computer-assisted learning. Journal of Educational Psychology, 1969, 60, 343-350.

Pyke, S., & Agnew, N. Digit span performance as a function of noxious stimulation. Journal of Consulting Psychology, 1963, 27, 281.

Sarason, I. G. Empirical findings and theoretical problems in the use of anxiety scales. Psychological Bulletin, 1960, 57, 403-415.

Spence, J. T., & Spence, K. W. The motivational components of manifest anxiety: drive and drive stimuli. In C. D. Spielberger's (Ed.) Anxiety and behavior, New York: Academic Press, 1966, 291-326.

Spence, K. W. A theory of emotionally based drive (D) and its relation to performance in simple learning situations. American Psychologist, 1958, 13, 131-141

Spence, K. W. Anxiety (drive) level and performance in eyelid conditioning. Psychological Bulletin, 1964, 61, 129-139.

Spielberger, C. D. The effects of manifest anxiety on the academic achievement of college students. Mental Hygiene, 1962, 46, 420-426.

Spielberger, C. D. The effects of anxiety on complex learning and academic achievement. In C. D. Spielberger's (Ed.) Anxiety and behavior. New York: Academic Press, 1966, 361-398. (a)

Spielberger, C. D. Theory and research on anxiety. In C. D. Spielberger's (Ed.) Anxiety and behavior. New York: Academic Press, 1966, 3-20. (b)

Spielberger, C. D. Anxiety as an emotional state. In C. D. Spielberger's (Ed.) Anxiety: Current trends in theory and research. New York: Academic Press, 1972.

Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. The state-trait anxiety inventory (test manual). Palo Alto: Consulting Psychologist Press, 1970.

Spielberger, C. D., & Katzenmeyer, W. G. Manifest anxiety, intelligence, and college grades. Journal of Consulting Psychology, 1959, 23, 278.

Spielberger, C. D., Lushene, R. E., & McAdoo, W. G. Theory and measurement of anxiety states. In R. B. Cattell's (Ed.) Handbook of modern personality theory. Chicago: Aldine, 1971.

Spielberger, C. D., O'Neil, H. F., & Hansen, D. N. Anxiety, drive theory, and computer-assisted learning. In B. A. Maher's (Ed.) Progress in experimental personality research. New York: Academic Press, 1973.

Spielberger, C. D., & Smith, L. H. Anxiety (drive), stress, and serial position effects in serial verbal learning. Journal of Experimental Psychology, 1966, 72, 589-595.

Spielberger, C. D., & Weitz, H. Improving the academic performance of anxious college freshmen: A group-counseling approach to the prevention of underachievement. Psychological Monographs, 1964, 78, No. 13 (Whole No. 590)

Spielberger, C. D., Weitz, H., & Denny, J. P. Group counseling and the academic performance of anxious college freshmen. Journal of Counseling Psychology, 1962, 9, 195-204.

Taylor, J. A. A personality scale of manifest anxiety. Journal of Abnormal and Social Psychology, 1953, 48, 285-290.

Underwood, B. J. Ten years of massed practice on distributed practice. Psychological Review, 1961, 68, 229-247.

Waechter, R. F. A comparison of achievement and retention by college students in an earth science course after learning under massed and spaced conditions. Dissertation Abstracts, 1967, 27 (11-A), 3642-3643.

Appendix A: Consent Form

Informed Consent Form

Randy Waid has explained my participation in this experiment. I am fully aware of the following points and I volunteer to participate:

1. The experiment will require up to 1½ hours of my time and I will be performing on a reading comprehension task.
2. I will be asked to fill out questionnaires about myself. These will remain confidential.
3. I am aware that I can terminate participation in the experiment at any time.
4. Confidentiality will be stressed. Although results of the experiment may be made public, my identity and information concerning my performance will be anonymous.

_____

Signature of Participant

_____ _____

Witness Date

Appendix B: Questionnaire to Assess Experimental Manipulations

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DIRECTIONS: A number of questions about the experiment that you have just completed are given below. Read each question and then circle the appropriate number to indicate your response.

1. Concerning the opening instructions - to what extent did you believe that if you failed to obtain 80% correct answers on the multiple-choice test that you would be asked to return and repeat the study?

NOT AT ALL SOMEWHAT MODERATELY SO VERY MUCH SO

1 2 3 4 5 6 7

2. How motivate were you to perform well on this reading comprehension task?

NOT AT ALL SOMEWHAT MODERATELY SO VERY MUCH SO

1 2 3 4 5 6 7

3. To what extent did you believe that how well one does on the multiple-choice test is highly correlated to his or her scholastic ability?

NOT AT ALL SOMEWHAT MODERATELY SO VERY MUCH SO

1 2 3 4 5 6 7

4. During the experiment did you experience feelings of "giving up" or Quitting"?

NOT AT ALL SOMEWHAT MODERATELY SO VERY MUCH SO

1 2 3 4 5 6 7

5. To what extent do you believe that you did answer 80% of the multiple-choice questions correctly and, therefore, will not be asked to return and repeat the study?

NOT AT ALL SOMEWHAT MODERATELY SO VERY MUCH SO

1 2 3 4 5 6 7

Appendix C: Debriefing Interview

The following format was followed in the debriefing interview.

1. What do you think this experiment was about?
2. I wish to inform you that the opening instructions were fictitious, that is; your performance on the multiple-choice test is not related to your ability to do college level work, nor will you be required to return and repeat this study regardless of your score.
3. Explaination of the research.
4. Please do not communicate anything about the experiment to your peers.

Appendix D: Individual Data

	SEX	CEEB	A-TRAIT	1st A-STATE	2nd A-STATE	#CORRECT ANSWERS	RESPONSES to MANIPULATIONS QUESTIONNAIRE
LTMP							
1.	M	1080	31	40	30	24	3,5,5,2,7
2.	M	1020	30	28	32	16	2,5,2,1,4
3.	F	1080	28	33	26	19	6,6,5,3,3
4.	M	1080	27	23	23	24	1,6,3,1,2
5.	M	1100	25	31	32	22	7,7,4,1,4
6.	M	1120	31	36	31	25	2,6,5,2,7
7.	F	1050	26	31	33	20	3,5,4,1,3
8.	M	1020	31	36	33	17	2,4,2,1,1
9.	F	1080	23	28	36	16	3,3,2,2,3
10.	F	1130	25	29	33	19	1,5,1,3,1
11.	M	1120	27	29	21	27	1,5,2,1,5
12.	F	1130	30	38	40	20	6,4,5,2,7
13.	F	1050	31	33	38	19	7,7,3,1,5
14.	M	1080	27	41	38	21	5,5,7,1,5
15.	M	1060	31	33	33	15	1,5,1,1,1
LTDP							
1.	F	1110	28	33	41	11	3,5,3,1,1
2.	M	1110	28	34	30	24	1,5,2,1,2
3.	M	1120	24	24	31	23	7,7,4,2,5

	SEX	CEEB	A-TRAIT	1st A-STATE	2nd A-STATE	#CORRECT ANSWERS	RESPONSES to MANIPULATIONS QUESTIONNAIRE
4.	M	1130	27	26	23	14	3,5,3,3,3
5.	M	1030	29	35	38	22	5,6,6,3,2
6.	F	1040	30	37	45	18	6,2,1,4,4
7.	M	1090	28	40	39	20	6,6,3,3,4
8.	M	1080	23	29	25	20	5,7,5,1,5
9.	F	1120	27	37	34	18	6,7,5,4,5,
10.	F	1080	31	27	24	23	7,5,3,2,3
11.	F	1060	31	29	31	22	6,4,4,2,3
12.	F	1050	31	41	37	11	2,6,4,1,3
13.	M	1070	29	44	45	16	2,5,3,1,5
14.	M	1050	26	29	24	24	3,4,2,1,5
15.	F	1100	27	32	40	14	7,4,3,5,2
HTMP							
1.	M	1020	45	31	34	22	6,6,5,1,4
2.	M	1030	48	41	43	17	5,5,3,6,2
3.	M	1050	48	50	56	17	2,4,4,5,2
4.	F	1080	46	37	38	22	7,5,6,5,3
5.	M	1040	48	48	47	21	7,7,7,6,5
6.	F	1040	55	38	56	16	7,6,5,5,3
7.	M	1090	52	43	36	13	1,5,1,6,1
8.	M	1070	58	53	48	16	7,5,6,5,2
9.	M	1090	49	47	47	14	3,3,3,1,2

	SEX	CEEB	A-TRAIT	1st A-STATE	2nd A-STATE	#CORRECT ANSWERS	RESPONSES to MANIPULATIONS QUESTIONNAIRE
10.	M	1030	45	48	57	11	7,7,6,1,1
11.	F	1070	58	41	36	19	3,6,5,4,2
12.	F	1090	52	37	41	15	6,6,3,1,4
13.	M	1040	53	39	42	14	4,3,3,3,3
14.	M	1050	47	47	52	13	5,4,3,3,4
15.	F	1100	50	45	48	16	2,3,5,5,1
HTDP							
1.	F	1030	47	38	27	22	4,6,3,3,4
2.	F	1080	47	37	33	23	2,3,3,3,4
3.	F	1110	49	46	42	21	7,5,5,5,5
4.	M	1050	46	53	37	18	6,4,3,4,4
5.	M	1110	45	42	44	13	3,3,5,5,3
6.	F	1020	63	55	40	17	7,4,6,4,2
7.	M	1090	45	49	30	20	7,7,2,3,2
8.	M	1090	46	50	42	14	4,3,2,4,3
9.	M	1130	45	42	26	17	7,7,3,1,3
10.	F	1050	65	59	67	14	6,6,7,7,1
11.	F	1040	57	45	42	15	3,3,4,4,4
12.	F	1080	51	49	42	14	7,2,3,7,1
13.	F	1020	54	44	35	20	6,7,3,3,5
14.	M	1040	50	46	40	19	5,3,3,1,3
15.	M	1020	58	60	50	11	5,5,3,2,1