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ABSTRACT

This paper reports two experiments whose purpose was to relate two bodies of research on anxiety: test and trait-state anxiety. It was reasoned that state anxiety measures obtained in an evaluation testing condition should be more similar to test anxiety than state anxiety measures obtained in non-evaluative situations, such as a game in Study I or an instructional setting in Study II. The subjects consisted of sixty students drawn from an undergraduate educational psychology course. The results of both studies failed to confirm the hypothesis. Test anxiety was less sensitive to fluctuations of evaluative stress than state anxiety, and more closely related to general trait anxiety. The authors discussed a number of implications of these results which appeared to be of interest to anxiety theory in general. Both studies indicated that test anxiety is more nearly a trait measure than a state measure. (Author)

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TECH MEMO

TEST ANXIETY: SITUATIONALLY SPECIFIC OR GENERAL?

Sigmund Tobias and John J. Hedl, Jr.

Tech Memo No. 49
June 15, 1972

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TEST ANXIETY: SITUATIONALLY SPECIFIC OR GENERAL?[1]

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Anxiety is a construct of importance in many different behavioral disciplines. Research and theory on anxiety have typically treated this construct as a personality variable which was relatively stable over extended periods of time. The conception that anxiety had considerable situational variance was implicit in the construct of test anxiety as originated by Mandler and Sarason (1952), and most recently reviewed by Wine (1971). Spielberger, Lushene, and McAdoo (1971) have pointed to the importance of assessing the temporal fluctuations of anxiety over different situations in their conception of state anxiety. The purpose of the present study was to relate these two areas of research in which the situational and temporal characteristics of anxiety have been studied.

Spielberger, et al. (1971) have emphasized the necessity to distinguish between anxiety as a transitory state and anxiety as a relatively stable personality trait. Anxiety as a state (A-State) is conceptualized as an affective condition in the student characterized by feelings of dread or apprehension which vary in intensity, fluctuate over time, and are highly responsive to situational stress. Trait anxiety (A-Trait), on the other hand, is conceptualized as the relatively long term personality trait of anxiety proneness, i.e., the disposition to respond with elevations of state anxiety under conditions of threat

to self-esteem. Clearly, these two conceptions of anxiety are not independent of one another, and the theoretical expectation of a moderate positive relationship between state and trait anxiety has been empirically verified (Spielberger, Gorsuch, & Lushene, 1970).

Test anxiety was conceptualized as anxiety proneness in a specific situation: the testing situation. It was anticipated that a scale which focused specifically on the student's feelings about testing situations would be more closely related to test performance than measures dealing with anxiety as a more general personality trait. Operationally, test anxiety has been measured by the Test Anxiety Questionnaire (Mandler & Sarason, 1952) or by the Test Anxiety Scale (Sarason, 1958).

The test anxiety construct deals specifically with the feelings aroused in an individual in the testing situation. State anxiety, on the other hand, is not tied to any particular situation, but instead refers to the degree to which transitory feelings of anxiety may be aroused in <u>any</u> situation. Therefore, state anxiety aroused during a testing situation should be closely related to the construct of test anxiety. On the other hand, state anxiety aroused during a nontesting or nonevaluative situation, such as a game-like or an instructional situation, should be marginally related to test anxiety. It was the purpose of these two studies to test this hypothesis.

Study I

The research design consisted of placing students in a situation involving no explicit evaluative stress (game), and then administering

the Slosson Intelligence Test, a situation of some evaluative stress, via computer. Measures of state anxiety were obtained both before and after each of the two situations. Students participated in both types of tasks.

Procedures

The procedures were administered in the following sequence: (a) a pretask period during which students responded to the Test Anxiety Scale (TAS; Sarason, 1958) and the A-Trait scale of the State-Trait Anxiety Inventory (STAI; Spielberger, et al. 1970). (b) A nonevaluative period during which students played a game on a cathode ray terminal connected to an IBM 1500 instructional system. (c) An evaluative period during which the Slosson Intelligence Test (Slosson, 1963) was administered via computer. The five-item STAI A-State scale was administered both before and after the game and the intelligence test.

Nonevaluative Period. Students received written instructions informing them how to operate the computer terminal. They then responded to the brief five-item A-State scale, with instructions to respond in terms of "How do you feel right now." Practice in the operation of the terminal keyboard was presented and students "signed on" to the computer game.

During the game students worked individually at computer terminals. The game consisted of a simulated horse race in which artificial odds on six horses were given and an imaginary budget of $10,000 allotted for "betting." Students were then asked to indicate on which horses they wanted to bet, the amount of the bet, and whether they wished to bet to win, place, or show. After the best had been placed, the actual race was

viewed on a cathode ray terminal. Six horses were included in each race, represented by elongated "m"s. The computer program simulated the race by allowing the various "horses" to flash across the screen at a predetermined, randomly selected pace. Winning or losing at the game was randomly determined Students were allowed to play the horse race game for 20-25 minute periods. At the conclusion of any one race students were informed of the present status of their imaginary bank account and asked whether they wished to bet on the upcoming race. Following completion of the game period, the five-item A-State scale was readministered with instructions to indicate "How did you feel during the game you just played?"

Evaluative Period. A detailed description of terminal operations for the administration of the Slosson Intelligence Test on the computer terminal was presented. A brief attitude scale dealing with feelings toward computer testing was then administered. After "signing on" to the terminal, students again completed the five-item A-State scale with instructions to indicate how they felt at present.

The computer-administered Slosson Intelligence Test was then taken by each student. Test items were individually presented on the computer terminal and students responded to each question by typing in their responses. The computer program immediately evaluated the adequacy of answers, and when the scoring of particular items was indeterminate, students were asked to amplify their answers (Hedl, 1971).

The computer program began by presenting item 21-3 to all students. Following this item, the program proceeded sequentially in reverse to

establish a basal age. When basal age had been reached, students were branched forward to item 21-6 and the program continued to administer items until students reached either the test ceiling or the end of the test items. Ceiling was defined as failure on 10 consecutive items, and basal when this number was passed.

When the test had been completed, the five-item A-State scale was readministered with instructions to respond in terms of how they felt during the intelligence test they had just completed

Subjects

A total of 60 students participated in this experiment (25 males; 35 females). The sample was drawn from an undergraduate educational psychology course; volunteers received course credit for their participation

Results and Discussion

The hypothesis demanded that the A-State measure dealing with the students' feelings during the intelligence test would be highly similar to a measure of test anxiety This hypothesis was investigated by multiple linear regression techniques (Cohen, 1968) A full model was generated consisting of all four A-State scores, regressing into the TAS. Two restricted models were then formulated. In the first of these, the A-State dealing with the student's feelings during the intelligence testing was deleted. The difference in the percentage of variance accounted for by these models was, therefore, a measure of the importance of specific evaluative stress on the relationship between the A-State and TAS. The results of this comparison yielded an F of 1.98 (df = 1/55), which was

not significant. The second restricted model deleted both the A-States administered during the intelligence test. Again, comparison with the full model was not significant (F = 1.01, df = 2/55)

The results of this analysis indicated that the A-State measures during the evaluative stress condition did not contribute any more variance to test anxiety than did the A-State measures during the presumably nonevaluative game situation. The hypothesis that state anxiety evoked during evaluative situations would be highly similar to test anxiety was, therefore, not confirmed.

Since the initial analysis indicated that test anxiety was not substantially related to state anxiety during evaluative conditions as initially hypothesized, a succeeding analysis was conducted to determine whether test anxiety was more similar to the construct of trait anxiety. For this analysis, a second full model was formulated, containing the four A-State measures and the scores on the A-Trait scale. A restricted model was then formulated from which the A-Trait score was deleted, leaving only the four A-State measures. This comparison yielded an F of 5.18 (df = 1/54), significant beyond the 05 level The omission of the A-State measures from the full model in the presence of A-Trait did not result in a significant decline in accountable variance These results strongly suggest that the test anxiety conception can be viewed as more nearly a trait measure than a state measure

The design of this experiment assumed the Operation of differential state anxiety as a function of the game and testing situations. In order to evaluate this assumption, a one-way analysis of variance for repeated

measures (Winer, 1971) was computed on the four A-State measures. Table 1 presents the means and standard deviations of these measures.

TABLE 1

Means and Standard Deviations of the STAI A-Trait, TAS, and STAI A-State Scores (N = 60)

Measures	M	SD
STAI A-Trait	38.13	9 39
TAS	14 60	7 06
STAI A-State		
Pre Game	8 07	2 85
Post Game	7.47	2.92
Pre IQ Test	9 63	3.04
Post IQ Test	10.40	3 76

This analysis yielded an F of 20 65 (df = 3,177), significant beyond the .001 level. These results indicated that there was an overall difference in the levels of A-State evoked by the experimental treatments. A further comparison of the Post Intelligence A-State scores with the Post Game A-State scores yielded a correlated t of 6.80 (df = 59), significant beyond the .001 level. Thus, the A-State data confirmed the assumed increase in evaluative stress as a function of the experimental treatments. Subsidiary analyses were conducted to determine whether state anxiety interacted with sex, and/or with A-Trait, and thus obscured the general trend of the data. Both of these analyses revealed no evidence of such interactions.

Study II

In the study reported above the relationship between test and state anxiety was investigated in a game-like and in an intelligence testing situation. The game-like situation was the best available approximation to a condition of minimal evaluative stress. On the other hand, a game situation is relatively atypical in terms of trying to generalize from anxiety research to student functioning in everyday school-like settings. In order, therefore, to make the results more generalizable to educational settings, the relationships between test and state anxiety in an instructional and achievement testing situation were also evaluated.

Study II examined the effects of a number of instructional variations upon achievement, in addition to an examination of the effects of state and test anxiety. The experimental design involved assigning students randomly to studying an instructional program in one situation. In a second condition, the students were required to process the program at the same time that they were asked to recall CVC trigrams every 1, 2, or 3 frames. The second instructional treatment involved having half the students respond to the program by constructing their answers and receiving feedback concerning their accuracy. The other group read the program presented in the form of completed sentences. Achievement data pertaining to these differential instructional treatments will be reported elsewhere (Tobias, 1972a). The present report will focus on the relationship between the A-State measures and the Test Anxiety Scale during instructional and testing conditions.

Procedures and Subjects

When students reported for the experiment they were first administered the Test Anxiety Scale and the STAI A-Trait scale. Students were then familiarized with terminal operations, and randomly assigned to one of the four instructional treatments: reading the program with, or without interpolated CVCs, or constructing responses to the program with, or without CVCs. The five-item A-State scale was administered to each of these four groups at the following four points: prior to the instructional program, at the mid-point and end of the program, and at the end of the posttest

The content of the program used in this study dealt with the diagnosis of heart disease via electrocardiogram (Tobias, 1972b) The program covers the technical terminology used in the diagnosis of heart disease, the characteristic ECG tracings, and type of muscle damage caused by different severities of heart disease. The program was presented on the cathode ray tube of the IBM 1500 system, as was the posttest which was administered immediately after the program The four A-State anxiety scales were also administered on terminal A total of 121 students participated in this study with research participating being required for satisfactory completion of the introductory general psychology course

Results

The data of major interest concerned the relationship between the different STAI A-State scores and the Test Anxiety Scale. Again, it was expected that the A-State scale dealing with the students' feelings during the posttest should have a higher relationship with test anxiety than the

A-State measures administered during the course of instruction. It was, however, first necessary to determine whether the instructional manipulations had differential effects on A-State. A 2 x 2 x 4 ANOVA with repeated measures on the last factor was computed to examine this possibility. Five students were randomly deleted to achieve equal cell division. This analysis revealed that there were no differences in mean A-State scores between the groups studying only the program, and those doing program plus CVC (F = 1.36, df = 1/112). Nor were there any differences between the group constructing their responses and the group reading the programs (F = 1.69, df = 1/112). The interaction between these variables was also not significant (F = 2.7, df = 1/112). There were, however, significant differences among the four A-State measures (F = 4.87, df = 3/336, p < .01). Inspection of the four A-State means, depicted in Table 2, indicated that the A-State measure dealing with posttest was higher than

TABLE 2

Means and Standard Deviations of the STAI A-Trait, TAS, and STAI A-State Scores (N = 121)

Measures	M	SD
STAI A-Trait	39.09	9.02
TAS	16.98	6.82
STAI A-State		
Pre Instruction	9.83	3.16
Mid Instruction	9.69	3.79
Post Instruction	10.10	4.12
Posttest	10.88	4.22

any of the others This was substantiated in a Newman-Keuls analysis (Winer, 1971), which indicated that the A-State dealing with the posttest was significantly higher than the others This finding confirmed the assumption that the posttest was more stressful for the sample than were the instructional events There was some evidence of interaction among the instructional variables and repeated measures; however, these are of little relevance for purposes of the present report

The critical test of the hypothesis of Study II demanded that the A-State measures dealing with the student's feelings during the achievement test would be more similar to test anxiety than the A-States obtained during the instructional situation, and hence account for greater percentage of variance in TAS scores than the other A-State administered in the course of instruction The regression analysis of these data paralleled that conducted in Study I The full model again contained the four A-State measures and the first restricted model omitted the last A-State dealing with posttest This comparison accounted for 1% of the variance and yielded an F of 1.58 (df = 1/116), which was not significant. When both the A-State measures obtained at the end of instruction and following after the posttest were dropped from the model, this comparison yielded non-significant results (F = 1.04, df = 2/116). These findings indicated that the A-State measure concerning the achievement test and the A-State measure obtained at the end of instruction, singly or in combination, did not account for a significantly greater percentage of variance than did the A-State measures obtained at the beginning and in the middle of instruction.

To determine whether TAS was more clearly related to the conception of anxiety as a trait, as opposed to state, a further analysis was computed, similar to that in Study I, in which the contribution of A-Trait to the full model was determined. This analysis indicated that the addition of A-Trait score accounted for an additional 11% of the variance in TAS score, (F = 15.20, df = 1/115, p < .001). Omitting any or all of the four A-State measures from the models in the presence of A-Trait failed to reduce the percentage of variance accounted for to any significant degree.

General Discussion

The general hypothesis of both investigations was that state anxiety measures obtained during testing situations should reflect feelings more similar to those yielded by a test anxiety measure than state anxiety measures obtained either during a game-like or an instructional situation. The latter settings were conceptualized as involving less evaluative stress than the testing situations, and therefore it was assumed that they ought to be more closely related to affective phenomena indicated by test anxiety test scores. The assumption that the testing situation evoked more evaluative concern and consequently led to higher anxiety than the game and instructional settings was confirmed by the observed increase in A-State scores during the testing situations in both studies. While the students did perceive evaluative situations as more anxiety arousing, the hypothesis that this anxiety was more closely related to TAS scores than the preceding A-State scales was not supported in either investigation. Instead, the results suggested

that test anxiety as measured by the TAS was as closely related to anxiety feelings elicited during game-like and instructional situations as it was to anxiety feelings evoked during evaluative situations.

There are a number of implications of these results which are of some interest to anxiety theory in general. First of all, it seems clear that the test anxiety construct is not as responsive to variations in situational stress as is the state anxiety measure. Instead, both studies indicated that test anxiety is more nearly a trait measure than a state measure. In conception, a trait measure is relatively stable both over time and over different types of situations. While the relative temporal stability of a trait measure poses no special problems to the construct of test anxiety, its generality with respect to different situations should raise questions with respect to the specificity of the test anxiety construct. In the present investigation, test anxiety was as closely related to state anxiety elicited during games and within instruction, as it was to state anxiety evoked during an intelligence or achievement test. It seems unlikely that the students viewed the game and instructional situations as being similar in stress to the test situations.

Evidence against this formulation is seen in the significant increase of A-State during the test situations. Nevertheless, it is possible that even though the test situation was seen as more evaluatively stressful, both the game and instructional situation did have a component of evaluative stress which accounted for the similarity in its relationship to TAS. If this is indeed the case, the construct of test anxiety would have to be significantly widened. Not only would it appear to reflect

students' feelings during occasions such as intelligence tests, surprise exams, final exams, pop quizzes, etc (all of these are taken from items in the TAS), but they apparently also are equally related to such apparently nonevaluative settings as a game or a course of instruction. These results suggest that within the limits imposed by the students and designs of the present studies, the construct of test anxiety is considerably more general than had been expected, and may not be limited only to specifically evaluative situations.

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FOOTNOTES

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