

The relationship of state-trait anxiety and task difficulty to learning from written discourse*

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Concepts of anxiety derived from drive theory suggest that Ss who are high in A-Trait respond with high levels of A-State to difficult tasks and have a higher probability of error. Thirty-six undergraduate Ss were divided into high and low A-Trait groups based on the State-Trait Anxiety Inventory (STAI) scores and were randomly assigned a difficult or easy prose passage. Difficulty was manipulated through cloze procedures. Ss were given a 36-item retention test immediately after learning and 2 weeks later. Difficulty level was found to affect recall on immediate retention, but not on long-term recall. High A-Trait Ss did not demonstrate higher levels of A-State than low A-Trait Ss on immediate recall, but did so on long-term retention. Results were discussed in terms of Ss' habituating to threatening stimuli associated with the task and methodological differences in determining difficulty between the present study and previous research.

Drive theory suggests that anxiety has an interactive effect on performance, depending on the response repertoire of the learner relative to the task at hand (Spence & Spence, 1966). On complex tasks in which error tendencies are highly probable, high anxiety depresses performance. Performance is enhanced by anxiety on simpler tasks, where dominant responses are more appropriate to the demands of the situation.

Recent research on anxiety and learning reveals a growing interest in tasks relevant to actual instructional situations, particularly computer-assisted instruction (CAI) and programmed learning (e.g., O'Neil, Spielberger, & Hansen, 1969; Spielberger, O'Neil, & Hansen, 1972; Leherissey, O'Neil, & Hansen, 1971). Much of this research has used the State-Trait Anxiety Inventory (STAI) to measure anxiety (Spielberger, Gorsuch, & Lushene, 1970). The STAI distinguishes between anxiety as a transitory condition of tension and apprehension (A-State) and anxiety as a stable personality characteristic (A-Trait) which predisposes individuals to perceive situations as dangerous and, therefore, to perform under increased levels of A-State (Spielberger, 1966).

While recent research has not found a consistent "Aptitude by Treatment" interaction between A-Trait and variables such as task complexity, A-State scores have been found to be higher on difficult programmed materials than on easy ones (Spielberger et al, 1972). It appears likely that, in addition to task complexity, factors such as intelligence or aptitude must be

considered and/or controlled in order to evaluate the effects of A-Trait on performance.

This study investigated the effects of anxiety, as measured by the STAI, on the learning of prose materials typically found in college instruction. It was hypothesized that Ss with high A-Trait scores would perform more poorly in learning difficult prose material, and would be superior in learning easy material, while the performance of Ss with low A-Trait scores should be the reverse. Similar results were predicted to occur on long-term recall.

METHOD

Subjects

Sixty-eight undergraduate juniors and seniors enrolled in an educational psychology course at the University of Kansas served as Ss. The STAI A-Trait Scale (Spielberger et al, 1970) was administered to all Ss. Those scoring above the 63rd percentile on the norms for college undergraduates were operationally defined as high A-Trait Ss, while individuals scoring below the 37th percentile were placed in the low A-Trait group. There were 18 Ss at each level who were assigned randomly to either high- or low-difficulty treatments.

Materials

The prose materials consisted of a 1,500-word passage on physiological human development. The difficulty level of the passage was manipulated through cloze procedure, a technique in which words are deleted from the passage to be read in a predetermined manner (Taylor, 1953). The results of a pilot study with 30 college students indicated that a blackout ratio of every fifth word produced an error rate of 68% (high difficulty) on a 36-item multiple-choice test that assessed knowledge of the content of the passage. A 48% error rate (low difficulty) was obtained when no deletions from the text were made.

Procedure

The learning task was administered in a group session 1 week after STAI A-Trait scores were obtained. Ss read either the high- or low-difficulty version of the prose material and then answered the 36-item test. There was no time limit imposed on this task. Responses to the STAI A-State Scale were then obtained with standard instructions. Long-term recall of the prose material was assessed 2 weeks later on the same 36-item test, with A-State again recorded.

RESULTS AND DISCUSSION

Means and standard deviations for the recall scores obtained under each of the experimental conditions are reported in Table 1. Analysis of variance of immediate recall scores revealed that only the effect of task difficulty was significant ($F = 9.19$, $df = 1/32$, $p < .01$).

The results of the analysis indicated that A-Trait scores did not have the expected main effect on performance scores, nor did A-Trait scores interact with difficulty level of the learning task to facilitate or depress performance. The finding of no effect of A-Trait of performance, even though Ss were selected on the

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Table 1
Means and Standard Deviations of Immediate
and of Long-Term Recall Scores

Groups	N	Means		SDs	
		Immedi- ate	Long- Term	Immedi- ate	Long- Term
High A Trait- High D	9	11.78	10.56	2.97	3.37
High A Trait- Low D	9	16.56	9.89	4.08	2.51
Low A Trait- High D	9	13.00	11.11	4.83	4.37
Low A Trait- Low D	9	17.89	14.78	5.38	4.96

basis of extreme A-Trait scores, is consistent with research results using college Ss and CAI (Spielberger, O'Neil, & Hansen, 1972). A similar analysis of variance of long-term recall scores also failed to indicate any significant main effects, nor was there a significant interaction between difficulty level and A-Trait.

Additional analyses of A-State scores as a function of A-Trait and task difficulty were also conducted for both immediate and long-term recall. No significant main effects or interactions were found on immediate recall. A nonsignificant trend was noted, however, in that A-State scores tended to be higher on the more difficult material, which is a finding also noted by Spielberger et al (1972). Analysis of variance of A-State scores on the long-term recall task revealed a highly significant effect for A-Trait ($F = 9.62$, $df = 1/32$, $p < .01$), with A-Trait Ss demonstrating higher levels of A-State than low A-Trait Ss. A nonsignificant trend for A-State scores to be higher on more difficult material was noted, but there was no significant interaction between A-Trait and task difficulty.

Analysis of the results indicated two interesting changes between the immediate and long-term recall sessions. First, the significant difference in performance due to difficulty levels of the task disappears when, after a 2-week interval, long-term recall is assessed. One possible explanation for this change is the high degree of difficulty of the experimental task, as evidenced both in the high and low treatment conditions. Difficulty is a relative term, and it seems that even for college students our operationally defined "low difficulty materials" failed to produce mean performance at the 50% difficulty level. When the task is both so novel in content (e.g., cloze procedures) and of such difficulty that relatively little information is originally learned, apparent differences in immediate testing situations tend to decrease over time.

The second interesting change is that, while there was no effect of A-Trait or difficulty on A-State at immediate recall, A-Trait showed a significant effect on A-State during long-term retention. Differences in A-State for Ss who differ in A-Trait are produced only when the situation contains stressful or ego-threatening stimuli which can be reacted to differentially.

Presumably, high A-Trait Ss respond more emotionally in such situations than low A-Trait Ss. However, it may again be hypothesized that the original learning tasks were universally difficult and the experimental situation sufficiently threatening so that all Ss responded with relatively high A-State scores. On recall, when Ss had habituated somewhat to the task, the effects of the testing situation had a differential effect on Ss who differed in A-Trait.

Since performance was not significantly affected (even though the trend is toward the predictable interaction) by these differences, however, one might conclude that the concept of "task difficulty" needs careful operationalizing in experimental situations. The original formulations of the Spence & Spence hypothesis (1966) made differential predictions about performance relevant to task complexity. How this construct is to be equated with difficulty in an experimental situation is not at all clear to the writers. Spielberger (1972) has shown that rather predictable relationships between A-State and difficulty (defined as error rates) occur, while other studies have not shown the expected relationships (Spielberger et al, 1972). The sex of the sample, feedback conditions, the setting (e.g., a laboratory), all seem to have affected the responses of Ss.

In summary, it seems that in order to obtain differences in A-State for Ss who differ in A-Trait, some type of stress has to be introduced into the situation, usually by manipulating the difficulty of the material. However, the effect of difficulty, being a very relative term, is not easy to predict, since Ss not only respond to various stimuli in an experimental situation other than the materials themselves, but they also respond to different levels of difficulty in different ways. A-State and task performance can covary, but the essential nature of the relationship between the materials, their operationalized difficulty, and performance on the task seems unclear.

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