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TEST ANXIETY AND THE PASSAGE OF TIME

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Technical Report

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Three experiments were performed dealing with the relationship of test anxiety and achievement-oriented instructions to time perception. After being given either achievement-orienting or neutral instructions, subjects waited for an undesignated period of time, after which they performed on an intellectual task. The dependent measures were subjects' estimates of the duration of the waiting and performance periods and their scores on the assigned task. High test anxious subjects' time → (copy 1473B)		

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estimates were significantly greater than the estimates of the other subjects and their performance was at a relatively low level. Evidence was presented supporting the hypothesis that highly anxious persons under stress experience cognitive interference and preoccupation which makes time pass slowly and results in poor performance. The implications of the findings were discussed particularly in terms of the need for training programs capable of fostering improved cognitive skills requiring self-control.

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While the generalization that time is precious holds for many situations it does not always seem to have validity. There are situations in which time drags and one wishes it were possible to speed up the clock. For the football team behind 30-0 time moves slowly, while for the team on the way to victory time flies and its players desire more time to win "big". Similar differences in subjective time estimates seem to hold for many types of situations and events, a critical factor being the character of the particular situation. For example, waiting for what might be bad news about a loved one who is in the hospital can be excruciating and there is evidence that time passes very slowly for depressives (Bech, 1975). While the literature on time estimation is sizeable, much of the work done has focused on time estimation as a function of either personality characteristics (such as anxiety) or experimental conditions. (for example, Meade, 1966 and Siegman, 1962) In analyzing subjective judgments of time duration, it seems logical to consider simultaneously two variables, the situation and the characteristics a person brings to the situation (hopes, fears, etc.). (Buchwald and Blatt, 1974; Sarason, Smith & Diener, 1975). This paper reports the results of three experiments devised from this perspective. An important feature of the experiments is the inclusion of two types of data, time estimations and performance.

In these experiments subjects were told they would be administered a test of intelligence but that there would first be a waiting period. (There were also control groups not given the achievement-orienting communication). How does time pass while awaiting the

evaluation? Obviously the way in which the intellectual evaluation is construed has a bearing on the answers to these questions. Many psychological instruments reflect aspects of the construal process and the meanings individuals attach to particular types of situations. Scales dealing with well-defined situations, such as those designed to tap test and speech anxiety, can be viewed as measuring cognitive activity and worrying as it is stimulated by a specific event or demand (such as having to take a test or make a speech).

The personality measure used in the three experiments was the Test Anxiety Scale (TAS) (Sarason, 1972). High scorers on this measure have been shown to perform more poorly than others on difficult, complex tasks administered under achievement-orienting conditions that emphasize the evaluation of one's performance (Sarason, 1975). Test anxiety can be interpreted as a form of self-preoccupation, characterized by self-awareness, self-doubt, and self-depreciation, that influences overt behavior and psychological reactivity. Other types of anxiety might be similarly interpreted. The self-preoccupying thoughts of the highly anxious individual interfere with adaptation at several points in the course of information processing. They narrow or otherwise influence the attentional focus on environmental cues; distort encoding, transformation, and planning strategies; and influence responses that might be selected to cope with challenges confronting the individual.

Available evidence suggests that the relatively poor performance of highly test anxious persons under achievement-orienting conditions is not due to low intelligence, but rather to the cognitive inter-

ference of a personalized, self-centered approach to evaluational situations. The expectations of a highly anxious person seem to be different from those of others (Doris and Sarason, 1955). When this person performs poorly, it may not be due just to cognitive interference and self-preoccupation during the test. It may also be related to the time spent anticipating the test with dread. These personalized anticipations contribute to inefficient, ineffective preparation for the test.

The experiments reported here were aimed at providing information about the way in which persons differing in anxiety fill time. It was predicted that in the presence of achievement-orienting cues, time would pass more slowly for high anxious scorers than for middle and low anxious scorers. When these cues are not present there should not be a significant gap in estimates of the time duration among groups differing with regard to test anxiety. Furthermore, the effects of an achievement-orientation should be as noticeable while the individual is waiting to perform as during performance itself. The first two experiments dealt with these hypotheses and differed in the length of the waiting period preceding performance. In the third experiment, the performance period was greatly lengthened and a specially prepared post-experimental questionnaire was administered in an attempt to clarify the relationships among achievement-orientation, test-anxiety, and cognitive interference. It was expected that highly anxious persons who are underachievers would describe themselves as having more task-irrelevant thoughts than would persons with middle and low anxiety scores.

Experiment I

Method

Subjects

The subjects were 48 male and 48 female students from Introductory Psychology classes at the University of Washington. All subjects were approximately 18-19 years of age. Prior to and independent of the experiment, 550 students had taken the Test Anxiety Scale (TAS) (Sarason, 1972). The subjects were drawn from the top and bottom 15 percent of the distribution of TAS scores, and from a group in the middle of the distribution. The subjects in the high TAS group had scores of 26 and above; subjects in the low TAS group had scores of 9 and below. The middle TAS group had scores between these cutoff points. Subjects' assignment to experimental conditions was random within the requirements of the experimental design. (This method of assignment to conditions was followed in all three experiments.)

Procedure

After being escorted into the experimental room, subjects were asked to put their watches out of sight until the end of the session because, they were told, a watch might be a distracting stimulus during the experiment.

Each subject was given the task of writing a short self-description and a description of one other person. Three and one half minutes were allotted for each description. The subjects, who were run individually, were then given either achievement-orienting or neutral instructions. The achievement-orienting instructions were given as follows:

The test you are about to take is part of a widely used intelligence test. This is the most crucial part of this study, since it will be used to give me a measure of your intelligence. I have to get the materials. I'll be back shortly.

The experimenter then left the room and shut the door. Two minutes later, the examiner returned with the test materials and asked the subject to write in minutes and seconds the length of time he or she had been sitting alone. The examiner then continued with the following:

As I said, the test you are about to take is part of an intelligence test. This test has been found to predict such things as course grades, success in later life, and to some extent the kind of personality you possess. Of course, your own intelligence will primarily determine whether you do well or poorly on the test. At a later date you will have an opportunity to compare your I.Q. score with those of the other people in this study. You will then be able to determine how your abilities and capacities compare with other people like you.

The subject was then given a difficult version of the digit symbol task (variations of the letter "L") with the following instructions: "The purpose of this task is to put the symbols in the numbered boxes as prescribed by the code at the top of the page. Try the three examples". The materials were an adaptation of those employed by Sarason and Palola (1960). The subject then worked for 3½ minutes on the digit symbol task and was asked to write in minutes

and seconds the length of time he or she had been working on the test. The subject was then debriefed and excused.

The neutral instructions were as follows: "I have to get the materials we need. I'll be back shortly". The examiner then left, returned in two minutes, and asked subjects to write in minutes and seconds the length of time subject thought examiner had been gone. The examiner then gave instructions on how to perform the digit symbol task. The subject worked for $3\frac{1}{2}$ minutes after which he or she was asked to write in minutes and seconds the amount of time he worked on the task. The subject was then debriefed and excused.

Results

A $3 \times 2 \times 2$ analysis of variance (encompassing test anxiety, sex and conditions) of subjects' time estimates while waiting to do the digit symbol task failed to yield statistically significant results. However, the results for the Test Anxiety $\times$ Conditions interaction tended in the expected direction ($F(2,84) = 3.73$, $.05 < p < .10$). The mean waiting time estimate of the high TAS subjects in the experimental group was 156.8 seconds while the mean for the high TAS control group was 127.7. On the other hand, the middle and low TAS control and experimental group means were in the opposite direction. When the time estimates were grouped into intervals defined by over-, under-, or exact estimates of the actual time period, and a χ^2 analysis performed, anxiety and

conditions were found to interact significantly ($\chi^2(10) = 19.32, p < .05$). More high TAS subjects overestimated the interval when they believed they were waiting to take a test than was the case for the high TAS control group. More low and middle TAS subjects overestimated the interval when they believed they were waiting to perform on a neutral task than did low TAS who believed they were waiting to take a test. The results for time estimates of the period in which subjects performed were in the same direction as for the waiting period, but were not statistically significant.

An analysis of variance of the digit symbol performance scores yielded one significant result, that for the Test Anxiety main effect ($F(2,84) = 4.07, p < .05$). The low TAS mean (92.8) was higher than the middle (82.2) and high (81.5) means.

There were no significant sex differences in either Experiment I or II.

Experiment II

While in several respects the results of Experiment I were consistent with expectations, they tended to be weak and in some instances inconsistent; for example, the fact that the middle TAS group's performance scores more resembled that of the high than of the low TAS group. In the hope of uncovering more decisive relationships, a second related experiment was performed. Two changes pertained to the temporal variable. Because the 2 minute waiting period in Experiment I might not have been long enough to allow for significant effects of the test anxiety and experimental variables to show up, the waiting period in Experiment II was

lengthened to 4 minutes. In addition, subjects performed on the digit symbol task for 4 instead of $3\frac{1}{2}$ minutes.

Another change in Experiment II was the task on which subjects worked prior to performing the digit symbol task. Instead of writing a short self-description and a description of one other person, subjects performed for 7 minutes on an anagrams task. This type of concept formation task was deemed somewhat more consistent than the writing one with the experimental emphasis on the evaluation of intellectual performance. For the achievement-oriented group the anagrams were so difficult that it was certain no subject could complete the task in the allotted time. For the control group, the anagrams were relatively easy and all subjects successfully completed the task. The changes made in the prior task (particularly its difficulty level and time pressure) were designed to heighten stress on the evaluation of performance among subjects in the achievement-orientation group.

Subjects

The subjects were 120 undergraduates at the University of Washington. The 60 males and 60 females were divided into groups on the basis of their scores on the Test Anxiety Scale, using the same cutoff points as were employed in Experiment I.

Procedure

The experiment followed a $3 \times 2 \times 2$ analysis of variance design.

- The variables were:
- (1) TAS--high, middle, and low scorers
 - (2) Conditions--achievement-orienting and neutral control
 - (3) Sex--male and female subjects

Except for the following changes, this experiment employed the procedures of Experiment I:

- (1) Before performing on the digit symbol task, subjects worked on anagrams; easy ones for those in the control group, difficult ones for the experimental or achievement-orientation group.
- (2) The waiting period and time for performance on the digit symbol test were 4 minutes each.

Results

The analysis of variance for the subjects' estimates of the waiting period prior to performing on the digit symbol task yielded two significant results, the effects for Test Anxiety ($F(2,108) = 3.57, p < .05$) and Conditions ($F(1,108) = 5.03, p < .01$). The test anxiety result reflected larger waiting period estimates for the high (303.8) than for the low (274.1) and middle TAS (269.5) groups. The larger high TAS estimates were mainly attributable to the high TAS group that received the achievement-orienting condition. This is shown in the fact that the mean for this group was 337.6 while the high TAS neutral group mean was 270.0 ($F(1,38) = 4.31, p < .05$). Table 1 presents the mean waiting time estimates together with the

mean estimates of time spent on the digit symbol task and performance scores on that task. Because there were no significant differences, male and female results have been combined in Table 1.

The effects significant in the waiting period analysis were also significant in the analysis of subjects' estimates of time spent on the digit symbol task. The TAS main effect ($F(2,108) = 5.13, p < .01$) was due to higher estimates for the high (304.1) than for the low (262.7) and middle (258.9) TAS groups. Again, the higher high TAS mean was due mainly to the high TAS achievement-oriented group. The mean for this group was 346.3, while the comparable low TAS control group mean was 261.9. The TAS x Conditions interaction ($F(2,108) = 7.81, p < .001$) was attributable to differences between the high TAS (346.3) achievement-oriented group and all other groups in the experiment (combined mean = 261.0).

The analysis of digit symbol performance scores yielded two significant findings, one for the Test Anxiety ($F(2,108) = 7.82, p < .001$) and Test Anxiety x Conditions ($F(2,108) = 3.21, p < .05$). The main effect for Test Anxiety was due to poorer performance for the high than the middle and low TAS groups. This in turn was explicable largely in terms of the relatively poor performance of the high scoring group. The high TAS achievement-orientation mean was 68.5; the mean for the high TAS control group was 87.8; and the mean for all middle and low TAS groups combined was 100.5. These results contributed to the significant TAS x Conditions interaction.

Table 1

Experiment II. Mean waiting times estimates, task time estimates,
and digit symbol performance scores

	<u>Waiting Time (sec)</u>	<u>Task Time (sec)</u>	<u>Performance</u>
H-E*	337.6	346.3	68.5
H-C	269.9	261.9	87.8
M-E	279.0	258.1	100.4
M-C	260.0	259.8	98.6
L-E	285.0	266.8	100.6
L-C	253.3	258.5	102.6

*H, M, and L refer to high, middle, and low levels of test anxiety;
E and C to experimental and control conditions.

Experiment III

The procedural changes made in Experiment II led to more clear-cut results than were obtained in Experiment I. The findings of the two investigations support the conclusions that not only is the performance of high TAS subjects deleteriously affected by achievement-orienting instructions, but in addition they tend to overestimate both the duration of the test period and the period during which they wait to have their ability evaluated. This seems analogous to the tendency to exaggerate time spent in the dentist's waiting room and in his office. Anticipating and going through unpleasant, frightening, or threatening experiences seems to take up a lot of time. If this interpretation is correct the question arises: do persons differing in anxiety fill time periods in similar or dissimilar ways? Experiment III was designed to provide evidence relevant to this question and to extend the generality of results obtained in Experiments I and II.

In Experiment III the tasks used in Experiment II were reversed. All subjects worked on a digit symbol task prior to a waiting period and then were asked to solve a series of difficult anagrams. The period during which they were occupied with the anagrams was much longer than was the case for the post-waiting task in the earlier experiments. Following performance on the anagrams task, the subjects responded to a questionnaire dealing with their cognitive activity during that task.

Subjects

The subjects were 60 female undergraduates at the University of Washington. They were divided into groups on the basis of their TAS scores, using the same cutoff points as were employed in Experiments I and II.

Procedure

The experimental design encompassed two factors: (1) high, middle, and low TAS scores, and (2) achievement-orienting and neutral instructions. Each subject worked on the digit symbol task for 4 minutes. This was followed by a 4 minute waiting period. At the end of the waiting period, subjects performed for 18 minutes on a series of difficult anagrams. The experiment concluded with subjects responding to a questionnaire about cognitive activity while occupied with that concept formation task. The questionnaire was a modified version of one developed by Diener and Endresen (Reference note 1). It dealt with the tendencies during performance to have task-irrelevant thoughts (e.g., what the experimenter thought about the subject, wondering about how others had done on the task.)¹

Results

There were two significant Fs in the analysis of waiting period time estimates, those for Test Anxiety ($F(2,54) = 8.31, p < .001$) and Test Anxiety x Conditions ($F(2,54) = 3.31, p < .05$). The high, middle, and low TAS means were 321.8 sec., 270.4 sec., and 266.3 sec. respectively. The interaction result showed that the greater high TAS mean was attributable mostly to the high TAS group receiving

achievement-orienting instructions. The mean for that group was 357.0 sec. while the high TAS control group man was 286.5 sec. Table 2 presents the means of the four dependent measures for all groups in Experiment III.

The analysis of estimates of duration of the anagrams task also yielded two significant Fs, for Test Anxiety $F(2,54) = 3.29$, $p < .05$) and Test Anxiety x Conditions ($F(2,54) = 3.41$, $p < .05$). Again, the significant results were explicable largely in terms of the relatively large estimates given by the high TAS achievement-orientation group (see Table 2). The mean for that group was 1354.1 sec., while the mean for all other groups combined was 1112.3 sec.

When an analysis was performed on the number of correct responses to the anagrams task, only the Test Anxiety effect was statistically significant. ($F(2,54) = 3.35$, $p < .05$). As the means in the third column of Table 2 shown, this effect was due mainly to the relatively poor performance of the high TAS group receiving the achievement-orienting instructions.

There were two significant results in the analysis of interfering activity scores which were obtained by summing subjects' responses to the questionnaire's 11 items. These were the Fs for Test Anxiety ($F(2,54) = 5.33$, $p < .01$) and for Test Anxiety x Conditions ($F(2,54) = 3.27$, $p < .05$). As Column four of Table 2 shows, most of these significant effects were due to the high scores obtained by the high TAS achievement-orientation group, whose mean was 33.2. The mean for the

Table 2

Experiment III. Mean waiting time and task time estimates, anagram performance scores and cognitive interference scores.

	Waiting Time (sec)	Task Time (sec)	Anagrams Score	Cognitive Interference Score
H-E*	357.0	1354.1	3.3	33.2
H-C	286.5	1114.0	4.8	24.6
M-E	266.3	1031.5	5.5	18.2
M-C	274.4	1103.5	5.7	21.6
L-E	266.5	1172.0	5.0	19.8
L-C	265.0	1140.5	5.0	21.4

*H, M, and L refer to levels of test anxiety; E and C to experimental and control conditions.

high TAS control group was 24.6, and the combined mean for the middle and low TAS group was 20.3. Results for separate analyses of individual items were in every case in the same direction as the results presented for the questionnaire as a whole.

One item appended to the questionnaire asked the subject to indicate on a 7 point scale the degree to which her mind wandered while working on the anagrams task. An analysis of variance of these scores yielded significant F s for Test Anxiety ($F(2,54) = 3.45, p < .05$) and Test Anxiety x Conditions ($F(2,54) = 3.61, p < .05$), the directions of these results resembling those in the other analyses.

Discussion

Looking at the total picture provided by the findings of the three studies, it appears that persons for whom tests are noxious experiences (high TAS subjects) tend to overestimate to a greater degree than do others both the time during which their performance is being evaluated and the period during which they are waiting for the evaluation to take place. Adding to the picture is the fact that high test anxious subjects performed at significantly lower levels than did low and middle scorers when emphasis was placed on the evaluational implications of performance.

The evidence from Experiment III concerning cognitive interference is enlightening from the standpoint of what persons think about while working on a task. High test anxious subjects, more so than low and middle scorers, attribute to themselves preoccupations

about how poorly they are doing, how other people are fairing, and what the examiner will think about the subject. These findings are in line with those obtained by Diener and Endresen (Reference note 1). It is difficult not to interpret these preoccupations as having the effect of appreciably complicating the task at hand. Although a measure of cognitive interference during the waiting period was not obtained, it seems likely that similar preoccupations would have especially characterized high test anxious subjects then.

Janis (1958) has described the "work of worrying" as a step toward dealing effectively with a threatening or challenging reality situation. Arnold (1960) has also referred to worrying as a preparation for action. While this emphasis on the positive aspects of worry is commendable, sight must not be lost of the important fact of individual differences in worrying. The person who describes himself or herself as characteristically being a worrier might not be taking a positive first step in coping with stress when he or she begins to worry. Rather, the individual might be creating subjectively vivid personal fictions and exaggerations which, instead of being of help in the coping process, serve to exacerbate or create stress where it otherwise might not exist at all. A high score on a measure of trait anxiety might then be viewed as reflecting obsessive self-preoccupation and thereby the tendency to complicate situations that might already be sufficiently challenging. In the case of the TAS, inferences are drawn only to a defined domain of activity, being evaluated.

Doob (1971) has presented a cogent, wide-ranging survey of temporal dimensions of behavior. Further research is needed on the role of a number of temporal variables in stress and anxiety. For example, while high TAS scorers in Experiment III described themselves as very much self-preoccupied during the 18 minute long anagrams task it well might be that these covert responses were not evenly distributed throughout that time period. It would be interesting to obtain measures of cognitive interference at several points during performance. Similarly it would be valuable to have a clearer picture of cognitive activity during waiting periods. Breznitz (1971) has called attention to a process of incubation by which the stress value of a stimulus or situation is enhanced during a waiting period. The time interval between warning of an impending threat (for example, a test) and its actual occurrence merits study as an independent variable. Of equal importance is the variable of the time filler: what happens, if anything, during the waiting interval?

Another problem of both theoretical and practical significance is the matter of how to help people gain more control over their behavior in situations requiring anticipation of, and later coping with stress. The problem of self-preoccupation and its intrusive effects is not limited to the domain of anxiety. Some self-preoccupied persons worry, others respond covertly and overtly with anger, and still others are suspicious of potential unseen traps in the situations with which they must deal. The rapidly developing fields of cognitive training and cognitive therapy have much to

contribute to the analysis, and where desirable, reduction of the tendency to be self-preoccupied (Mahoney, 1974; Meichenbaum, 1972; Rimm and Masters, 1974). Training aimed at strengthening adaptive cognitive skills (e.g., planning a course of action, waiting patiently, and reducing intrusive self-preoccupation) is especially relevant in reactions to personal threat. In challenging situations, either self-imposed as in climbing a mountain or unexpected as in a sudden illness, the utilization of time can be of the utmost importance. Control over one's thoughts might be the decisive factor in successfully meeting a situational challenge.

The results of the series of experiments reported here lend support to the growing interest in a Persons x Situations approach to personality (Sarason, 1976; Sarason, Smith, & Diener, 1975). Two indices--estimates of the durations of time periods and performance--were found to be a joint function of a situational characteristic, whether or not emphasis was placed on an achievement orientation, and an individual difference variable, test anxiety. Other evidence from diverse fields supporting the need for an interactional psychology is now available (Magnusson and Endler, 1977, in press). To understand and predict behavior, data is needed about both the information provided by environmental situations and the characteristics of persons who must process the information.

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Footnote

¹The questionnaire is available from Irwin G. Sarason.

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