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THE TEST ANXIETY SCALE: CONCEPT AND RESEARCH

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In this chapter on research and theory on test anxiety, examples of relevant and representative research are followed by a description of the Test Anxiety Scale and how it is used in different kinds of investigations. Work in three areas is given special attention: (1) the interaction between test anxiety and evaluational stressors, (2) laboratory investigations aimed at strengthening adaptive skills needed to cope effectively with evaluational stressors, and (3) applied studies dealing with clinical and educational problems.

We have all noticed that there are marked individual differences in reactions to evaluational situations. The range of reactions extends from virtual immobilization in the face of potential criticism to exhilaration at the prospect of receiving accolades. Viewed from an information-processing point of view, it is important to identify the cognitive events that influence overt behavior and the personal meaning that an event has for the

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individual. The person who freezes on a final examination seems preoccupied with self-doubt and the consequences of failure, whereas the accolade-seeker seems confident and approaches the examination as an opportunity for receiving recognition. Research on test anxiety has focused primarily on people for whom academic or intellective evaluations are worrisome events. Before turning to that topic, first consider a few issues pertinent to the general concept of anxiety.

THE CONCEPT OF ANXIETY

One of the sources of confusion about the meaning of anxiety has been lack of agreement concerning whether the word *anxiety* should refer to observable or recordable events (accelerated heart and breathing rates, self-reports) or to a hypothetical state. Part of this confusion grows out of the frequent almost simultaneous use of anxiety in both these two senses. For example, at some points, Freud referred to certain observable symptoms (personal tension, discomfort) as anxiety, and at others, he talks about anxiety as an inferred unconscious process that elicits defensive maneuvers on the part of the ego.

Situations and Their Interpretations

It seems to me essential that an analysis of anxiety begin with the objective properties of situations and individuals' interpretations of them. Regardless of the objective situation, it is personal interpretation of the situation that leads to behavior. An apple in the refrigerator will not be eaten unless it is noticed. Someone who is insulted, but isn't aware of it, will not become upset. A person who has lung cancer, but is unaware of it, will not worry. A person whose lungs are in good condition, but who is afraid he has lung cancer, may experience tension or even panic when some minor congestion associated with a cold becomes manifest.

What happens when we are confronted with different types of situations? Situations provide information and each of us processes it in a distinctive way. Although the last decade has yielded many valuable insights into the way in which individuals process relatively discrete stimuli (for example, visual displays), investigation of how information from complex situations (for example, social relationships, failure on a task) is processed has only recently begun (Mischel, 1973; Sarason, 1975).

Cognitive appraisal, which includes categorizing and interpretating events, is part of every person's information-processing system. A problem arises when one realizes that there are several ways of handling a situation but is not sure about the best or most appropriate course of action. Solving this problem involves some sort of memory search and a weighing of alternatives, as a result of which a response is selected as the best fit given the situational demands. After the response has been made, the one might give the response no further thought, or one might perhaps regret that it was selected over other alternatives. An important, but at the present time murky, problem concerns the structure of an individual's information-processing system, assumptions, construals of reality, and implicit rules in selecting and evaluating responses.

Another problem concerns the degree to which behavior is transituational, that is, some function of generalized ways in which individuals construe themselves, the environment, and the available options. Behavior in any given situation is a function of the demands perceived to inhere in it and also of characteristic transformations of informational inputs and problem-solving strategies. The following are four commonly observed ways of handling situational inputs:

1. A task-oriented problem-solving approach
2. Avoidance of stressful situations
3. Defensive distortion of the situation through projection, rationalization, denial, etc.
4. Anxiety

Situations, Cognitive Processes, and Anxiety

An individual in a given situation might not feel up to the situational requirements, that is, his or her available responses, if any, might be perceived as less than adequate. *Anxiety* is a type of cognitive response marked by self-doubt, feelings of inadequacy, and self-blame. One might say that whereas stress often inheres in one's interpretation of a situation, anxiety is a response to perceived inability to handle a challenge or unfinished business in a satisfactory manner. It is experienced when one feels unable to do

anything significant about what Klinger (1975) has called one's "current concerns." Among the characteristics of anxiety responses are:

1. The situation is seen as difficult, challenging, and threatening.
2. The individual sees himself or herself as ineffective in handling, or inadequate to, the task at hand.
3. The individual focuses on undesirable consequences of personal inadequacy.
4. Self-deprecatory preoccupations are strong and interfere or compete with task-relevant cognitive activity.
5. The individual expects and anticipates failure and loss of regard by others.

These characteristics can become linked to situations through experience. Anxiety might be associated with any or all of the following: anticipating a situation, experiencing it, and "recovering" from it. There are varied, often quite idiosyncratic, biophysical concomitants of anxiety. Both the quantity of anxiety and the mix of situations in which it is experienced vary from person to person:

1. Anxiety can be experienced in well-defined situations commonly seen as stressful to which the individual feels unable to respond adequately.
2. It can be experienced in ambiguous situations where the individual must structure task requirements and personal expectations.
3. It might be linked to classes of situations defined in idiosyncratic ways (interpersonal relationships with certain groups of peers, family members, female authority figures, members of the opposite sex; situations requiring verbal, mathematical, spatial, or motoric skills).

The view presented here bears some similarities to that of Freud in that anxiety is viewed as a state marked by heightened self-awareness and perceived helplessness. This helplessness can arise from inability to cope with a situational demand in a satisfactory manner, perceived inability to understand situational demands, or uncertainty about the consequences of inadequacy in coping.

Seligman (1975) has highlighted another aspect of anxiety, the person's perceived inability to predict and control dangers (stressors) in the environment. The self-preoccupations of the anxious person, even in apparently neutral or even pleasant situations, may be due to a history of experiences marked by a relative paucity of signals indicating that a safe haven from danger has been reached.

The reasons for the perception of danger are various, including the stimulus properties of situations and unrealistically high standards. Every teacher knows students who, while quite able and bright, are virtually terror stricken at exam time. In these cases, a student often expresses concern about the consequences of not performing at a satisfactory level and embarrassment at what is regarded as "failure."

A promising recent development is work on *cognitive restructuring* in which efforts are made to help the individual acquire new cognitive skills as replacements for maladaptive ones. For example, one of the difficulties experienced by highly test-anxious students is the deleterious intrusion during examinations of task-irrelevant cognitive reactions to stress. Whereas most students read test questions and proceed to answer them, highly test-anxious individuals find themselves thinking about the consequences of failure and how much better prepared the other students are. Efforts to reduce the potency of these intrusive self-preoccupations have yielded encouraging results. Highly test-anxious students benefit from exposure to models who display adaptive task-relevant behavior and also from training exercises designed to strengthen attention to task-relevant activity and extinguish personalized preoccupying thoughts (Sarason, 1973; Wine, 1971).

Clinical efforts to achieve anxiety reduction and behavior change through exploration of the personalized meanings attached to situations have increased during recent years (Ellis, 1962; Meichenbaum, 1972). Where there are several clinical problems, it may be difficult to identify precisely the class or classes of situations that evoke anxiety. Test anxiety could be part of a complex array of self-preoccupations. In some cases, these classes may be traceable to early experiences for which the child was not cognitively ready. In cases of psychosis, identifying cognitive structures that realistically can be bolstered may be as formidable a task as instituting a restructuring program.

TEST ANXIETY: CONCEPT AND MEASUREMENT

When the characteristics of anxiety are linked to academic or evaluation situations, we speak of test anxiety. The highly test-anxious person worries about examinations and shows physiological reaction patterns that go along with worry. Worry is a cognitively demanding activity marked by self-preoccupation, self-depreciation, and concern over the consequences of poor performance. It would be expected to interfere with performance on complex tasks when the evaluational dimension is emphasized. Under neutral conditions, this interference should be either less potent or absent.

To use the concept of test anxiety empirically, an index of the variable is needed. A number of indexes are now available. The first of these was the Test Anxiety Questionnaire (Mandler & S. Sarason, 1952), which consisted of a series of graphic rating scales. In 1958, I described the 21-item true-false Test Anxiety Scale (TAS) (Sarason, 1958). As a result of factor analyses and item analyses, the TAS has since undergone a number of revisions. The first of the revisions involved "pruning"; items with marginal part-whole correlations were dropped. The version that has been used during the past several years is the 37-item TAS developed because it was felt that a longer scale would increase sensitivity and reliability. New items were written and, together with the original items, administered to a large group of college students. Correlations of each item with total score (minus the item) were computed. The surviving items were subjected to a replication. This 37-item version follows:

(T) 1. While taking an important exam I find myself thinking of how much brighter the other students are than I am.
(T) 2. If I were to take an intelligence test, I would worry a great deal before taking it.
(F) 3. If I knew I was going to take an intelligence test, I would feel confident and relaxed, beforehand.
(T) 4. While taking an important examination I perspire a great deal.
(T) 5. During course examinations I find myself thinking of things unrelated to the actual course material.
(T) 6. I get to feel very panicky when I have to take a surprise exam.
(T) 7. During tests I find myself thinking of the consequences of failing.
(T) 8. After important tests I am frequently so tense that my stomach gets upset.
(T) 9. I freeze up on things like intelligence tests and final exams.
(T) 10. Getting a good grade on one test doesn't seem to increase my confidence on the second.
(T) 11. I sometimes feel my heart beating very fast during important tests.
(T) 12. After taking a test I always feel I could have done better than I actually did.
(T) 13. I usually get depressed after taking a test.
(T) 14. I have an uneasy, upset feeling before taking a final examination.
(F) 15. When taking a test my emotional feelings do not interfere with my performance.
(T) 16. During a course examination I frequently get so nervous that I forget facts I really know.
(T) 17. I seem to defeat myself while working on important tests.
(T) 18. The harder I work at taking a test or studying for one, the more confused I get.
(T) 19. As soon as an exam is over I try to stop worrying about it, but I just can't.
(T) 20. During exams I sometimes wonder if I'll ever get through college.
(T) 21. I would rather write a paper than take an examination for my grade in a course.
(T) 22. I wish examinations did not bother me so much.
(T) 23. I think I could do much better on tests if I could take them alone and not feel pressured by a time limit.
(T) 24. Thinking about the grade I may get in a course interferes with my studying and my performance on tests.
(T) 25. If examinations could be done away with I think I would actually learn more.

(F) 26. On exams I take the attitude "If I don't know it now there's no point worrying about it."
(F) 27. I really don't see why some people get so upset about tests.
(T) 28. Thoughts of doing poorly interfere with my performance on tests.
(F) 29. I don't study any harder for final exams than for the rest of my course work.
(T) 30. Even when I'm well prepared for a test, I feel very anxious about it.
(T) 31. I don't enjoy eating before an important test.
(T) 32. Before an important examination I find my hands or arms trembling.
(F) 33. I seldom feel the need for "cramming" before an exam.
(T) 34. The University ought to recognize that some students are more nervous than others about tests and that this affects their performance.
(T) 35. It seems to me that examination periods ought not to be made the tense situations which they are.

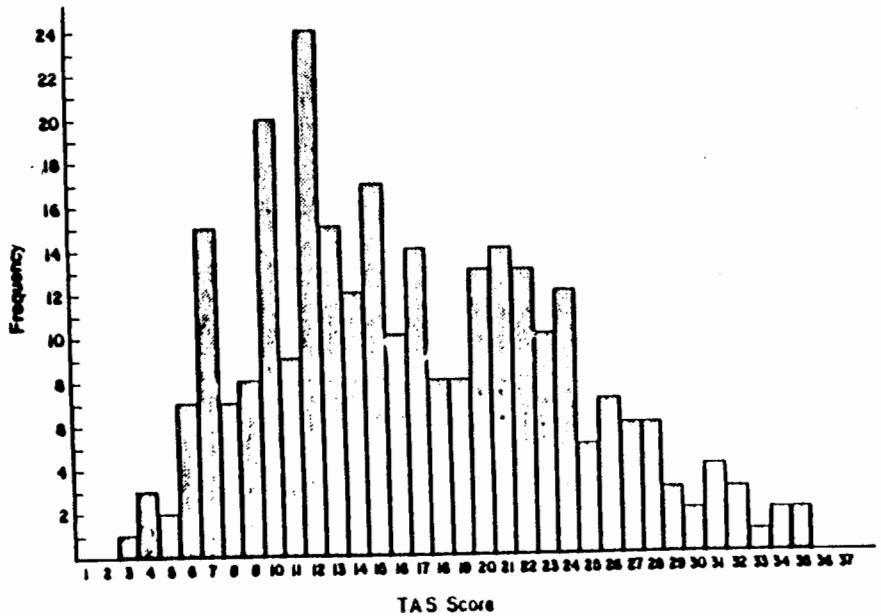

Fig. 10-1. Frequency distribution of TAS scores for 283 male students at the University of Washington, fall 1976.

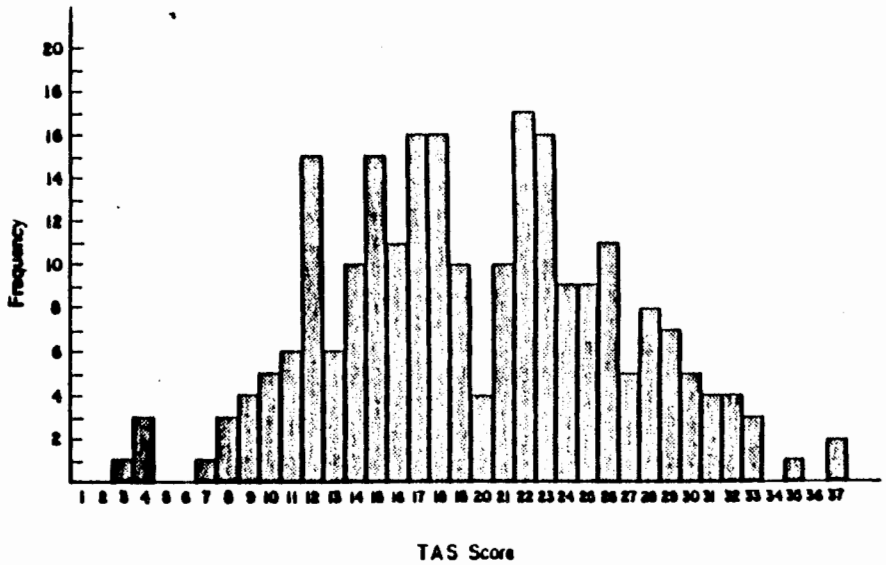

Fig. 10-2. Frequency distribution of TAS scores for 237 female students at the University of Washington, fall 1976.

(T) 36. I start feeling very uneasy just before getting a test paper back.
(T) 37. I dread courses where the professor has the habit of giving "pop" quizzes.

Test-retest reliabilities over .80 have been obtained for intervals of several weeks. Wagaman, Cormier, and Cormier (1975) have reported a test-retest reliability coefficient of .87. Figs. 10-1 and 10-2 present TAS score distributions for 283 male and 237 female undergraduates at the University of Washington. Table 10-1

Table 10-1

Characteristics of TAS Score Distributions Presented in Figs. 10-1 and 10-2

	Males	Females
Mean	16.72	19.74
Median	15.65	19.15
Standard deviation	7.12	6.73
Range	3-35	3-37

presents the means, medians, standard deviations, and ranges for these distributions.

The TAS can be used in diverse ways. It has been employed as an independent variable to compare groups of extreme scorers in particular kinds of situations. It has also been employed as a dependent variable reflecting the operation of an experimental or clinical treatment. Examples of these uses are given in succeeding sections.

TEST ANXIETY AND EVALUATIONAL STRESSORS

There is considerable evidence that the performance of high TAS scorers on complex tasks is deleteriously affected by evaluational stressors (Sarason, 1960, 1972, 1975). The less complex, less demanding the task, the weaker this effect is. An example of an evaluational stressor is achievement-orienting instructions that either inform subjects that some kind of evaluation of their performances will be made or provide some other rationale for the importance of performing well. When persons are reassured that a negative evaluation of their performance will not be made, high TAS scorers often perform as well or better than do low scorers.

A recent investigation by Sarason and Stoops (1976) illustrates the use of the TAS in testing hypotheses about both performance and cognitive processes. The investigation comprised a series of three experiments concerning subjective judgments of the passage of time. After being given either achievement-orienting or neutral instructions, subjects waited for an undesignated period of time, after which they performed an intellective task. The achievement-orienting manipulation involved telling the subject that the task was a measure of intelligence. The dependent measures were subjects' estimates of the duration of the waiting and performance periods and their scores on the assigned task.

The experiments were aimed at providing information about the way in which individuals differing in anxiety fill time. It was predicted that, in the presence of achievement-orienting cues, time would pass more slowly for high than for middle and low TAS scorers. When these cues are not present, there should not be a significant gap in estimates of time duration among groups differing in test anxiety. Furthermore, it was felt that the effects of an achievement orientation should be as noticeable while the individual is waiting to perform as during performance itself.

I report here only the results of the third experiment in the study. The findings of the first two experiments supported the conclusion that, not only is the performance of TAS subjects deleteriously affected by achievement-orienting instructions, but the subjects also tend to overestimate both the duration of the test period and the period during which they wait to have their ability evaluated. This appears analogous to the tendency to exaggerate time spent in the dentist's waiting room and office. Anticipating and going through unpleasant, frightening, or threatening experiences seem to take up a lot of time. If this interpretation is correct, the question arises: Do individuals differing in anxiety fill time periods in similar or dissimilar ways? The third experiment dealt with this question.

In the experiment, college students worked on a digit-symbol task prior to a waiting period and then were asked to solve a series of difficult anagrams. The subjects then responded to a questionnaire dealing with their cognitive activity during the anagrams task. The subjects were 60 female undergraduates. The experimental design encompassed two factors: (a) high, middle, and low TAS scores; and (b) 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 the anagrams. The experiment concluded with subjects responding to the Cognitive Interference Questionnaire:

I. We are interested in learning about the kinds of thoughts that go through people's heads while they are working on a task. The following is a list of thoughts some of which you might have had *while doing the task on which you have just worked.* Please indicate approximately how often each thought occurred to you while working on it by placing the appropriate number in the blank provided to the left of each question.

Example 1 = never
2 = once
3 = a few times
4 = often
5 = very often

___ 1. I thought about how poorly I was doing.
___ 2. I wondered what the experimenter would think of me.
___ 3. I thought about how I should work more carefully.
___ 4. I thought about how much time I had left.
___ 5. I thought about how others have done on this task.
___ 6. I thought about the difficulty of the problems.
___ 7. I thought about my level of ability.
___ 8. I thought about the purpose of the experiment.
___ 9. I thought about how I would feel if I were told how I performed.
___10. I thought about how often I got confused.
___11. I thought about things completely unrelated to the experiment.

II. Please circle the number on the following scale which best represents the degree to which you felt your mind wandered *during the task you have just completed.*

Not at all 1 : 2 : 3 : 4 : 5 : 6 : 7 very much

There were two significant factors in an analysis of variance performed on waiting-period time estimates, those for Test anxiety ($p < .002$) and Test anxiety X Conditions ($p < .05$). The time estimates means for the high, middle, and low TAS groups were 321.8, 270.4, and 266.3 seconds, respectively. The significant interaction was attributable to the higher time estimates mean obtained by the high TAS group receiving achievement-orienting instructions. The mean for that group was 357.0 seconds, whereas the high TAS control group mean was 286.5 seconds. Table 10-2 presents the means of the four dependent measures for all groups in the experiment.

The analysis of estimates of duration of the anagrams task also yielded two significant factors, for Test anxiety and Test anxiety X Conditions (each at the .05 level). Again, the significant results were explicable largely in terms of the relatively large estimates given by the high TAS achievement-orientation group (see Table 10-2). The mean for that group was 1354.1 seconds, whereas the mean for all other groups combined was 1112.3 seconds.

When an analysis was performed on the number of correct responses to the anagrams task, only the Test anxiety factor was statistically significant. As the means in the third column of Table 10-2 show, this effect was due mainly to the relatively poor performance of the high TAS group receiving the achievement-orienting instructions.

Table 10-2

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

Note. H, M, and L refer to levels of test anxiety; E and C refer to experimental (achievement-orientation) and control conditions.

There were two significant results in the analysis of cognitive interference scores obtained by summing subjects' responses to the questionnaire's 11 items. These were the factors for Test anxiety ($p < .001$) and for Test anxiety X Conditions ($p < .05$). As column four of Table 10-2 shows, most of the interaction effects were due to the high scores obtained by the high TAS achievement-orientation group, whose mean was 33.2. The mean for the 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.

An 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 factors for Test anxiety ($p < .05$) and Test anxiety X Conditions ($p < .05$), the directions of these results resembling those in the other analyses.

It seems as though individuals 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 highly 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 concerning cognitive interference is enlightening from the standpoint of what people think about while working on a task. Highly test-anxious scorers, more so than low and middle scorers, attribute to themselves preoccupations about how poorly they are doing, how other people are faring, and what the examiner will think about the subject. It is difficult not to interpret these preoccupations as 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 characterized highly test-anxious subjects then, too.

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. Although this emphasis on the positive aspects of worry is commendable, we shouldn't lose sight of the important fact of individual differences in worrying. People who describe themselves as *characteristically* being worriers might not be taking a positive first step in coping with stress when they begin to worry. Rather, an individual might be creating subjectively vivid personal fictions and exaggerations that, 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 are already sufficiently challenging.

A problem of both theoretical and practical significance is 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 people worry; others respond covertly and overtly with anger; and still others are suspicious of unseen traps in the situations with which they must deal. The rapidly developing work on cognitive training and cognitive therapy has much to contribute to the analysis and, where desirable, to the reduction of the tendency to be self-preoccupied (Mahoney, 1974; Meichenbaum, 1972; Rimm & 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 particular situational challenge. It is to this topic of control of thoughts and its relationship to stress that we now turn.

COPING WITH TEST ANXIETY

One of the most promising recent developments in the areas of stress and test anxiety is research aimed at strengthening persons' ability to handle tensions and problematic situations. Whereas the research focus for many years had been on what stress and test anxiety "do" to people, building competencies is now also a major concern. An example of this latter approach is Sarason's (1973) study using an anagrams task similar to the one employed in the experiment just described. In the 1973 study, subjects differing in test anxiety were given the opportunity to observe a model who demonstrated effective ways of performing the task. Using a talk-out-loud technique, the model displayed several facilitative thoughts and cognitions. The major finding was that high TAS subjects benefited more from the opportunity to observe a cognitive model than did low TAS scorers.

Let us look now at a more recent study. Its aim was to determine whether a different kind of cognitive intervention might help people cope more adaptively with an ego-threat—failure on an intellective task. Failure, of course, is one of the most venerable ways of creating an anxiety-provoking situation for subjects in psychological research. Failure reports seem to have especially deleterious effects on the subsequent performance of highly test-anxious individuals (Sarason, 1960). One interpretation of these effects is that failure arouses self-preoccupying thoughts about the consequences of failure, self-depreciation, and loss of status. These cognitive activities interfere with task-relevant activities and serve to lower postfailure performance.

If this line of reasoning is valid, it becomes important to determine whether, and if so how, these task-irrelevant cognitive

activities can be reduced or eliminated and replaced by more adaptive ones. In a test of this possibility, 128 college undergraduates (half men, half women) worked on 5 very difficult anagrams for 5 minutes. Pilot work had shown that most subjects could solve no more than a few of the anagrams in this period of time. In fact, none of the subjects obtained more than 3 correct solutions. After the 5-minute period came to an end, the experimenter scored each protocol and noted that the subject had failed to complete the task. The experimenter asked the subject whether he or she was having academic difficulties and observed that people of above-average intelligence should be able to perform at a higher level than did the subject. (After the experiment, the subjects were debriefed about this deception and the purposes of the experiment were discussed.)

After the failure report, each subject was told that the 5-minute anagrams task was preliminary to a longer, more difficult one. The experimenter stated that before beginning what he referred to as the "main event," there would be a 6-minute waiting interval. At this point, the experimental variable was manipulated. There were four conditions:

1. The subject sat alone in the experimental room for the 6 minutes.
2. Prior to waiting, the experimenter was reassuring, telling the subject not to take the anagrams performance too seriously. The experimenter made comments such as: "Don't worry," "Don't become too preoccupied," "Take it easy while you are waiting to begin the next task." All subjects receiving Conditions 1 and 2 were told the following:

> You just had what I guess could be called a failure experience. No one likes to fail, of course. We prefer to think we are able and competent. What some people tend to forget is that not doing well on a task provides information about what we need to know. With the information it is possible to strengthen our weaknesses and develop skills needed for the particular job we are working on.
>
> It is obvious that no one likes to perform poorly. What is less obvious is the fact that some people get so upset about their poor performance they can't pay enough attention to the task confronting them. These people may blame themselves for their failure or they may not be able to concentrate on anything except how stupid and embarrassed they feel—they may become self-preoccupied and too wrapped up in themselves, their thoughts, and their worries.

3. In addition to these statements, the subjects in this group were also told:

> There are things you can do to actually put poor performance to good use. If you direct your thoughts to the work to be done rather than to yourself, you'll be off to a good start. Directing your thoughts to the work to be done helps you stop persecuting yourself—and that's good.
>
> Take the anagrams you just worked on. They were a preview of the task I'll be giving you in a few minutes. Now some people get so upset with themselves on this type of preview that they can't devote enough thought to planning their attack on the main event. For example, there will be a waiting period before starting the main task. During that time the worst thing you could do is think about your frustration and embarrassment at not being a champion anagram-solver. Instead do some constructive planning and review the ground rules. These include:
>
> a. Don't let yourself get stuck on the first letter combination you try out. Be flexible. Try a different strategy if what you're working on proves unproductive.
> b. Look for letter combinations that occur frequently (for example, AN or RE). They might be part of the word you want to figure out.
> c. Keep in mind the fact that more English words begin with a consonant than a vowel.
> d. If you don't find a letter combination right away, keep looking. It's there and you'll find it.

I'll give you the anagrams in a few minutes. Use the rest period while waiting to get ready mentally.

4. The subjects in this group received only the communication immediately above.

There were 8 subjects in each cell defined by three factors:

1. *TAS.* high and low scores
2. *Sex.* male and females
3. *Experimental treatments.* the four conditions just described

The dependent variable in the 2 X 2 X 4 analysis of variance performed on the data was the number of seconds needed in solving the 10 problems presented after the waiting period. If, after 4 minutes, the subject had not solved an anagram, the experimenter provided the first letter of the word. If needed, additional hints were provided at 1-minute intervals. The procedure employed followed that described by Russell and Sarason (1965).

Because there were no significant differences attributable to sex, the results for males and females were combined. The TAS, conditions, and TAS X conditions effects were significant at better than the .01 level. The low TAS subjects performed at a higher level (shorter solution times) than did the high TAS subjects. The subjects under conditions in which they were given hints about preparing for the anagrams task or hints plus reassuring advice about not overreacting to failure performed at higher levels than did subjects under the other conditions.

The TAS X conditions interaction is of particular interest because it demonstrates the importance of looking at results from a persons X situations perspective. Table 10-3 presents the means and standard deviations for all groups involved in this interaction. The high TAS subjects in the control group (subject waits) performed at a significantly lower level than all other groups. Although not statistically significant in several instances, the TAS-reassurance-plus-hints subjects had the lowest mean solution time of all groups.

The results of this experiment show that performance on a complex task can be increased significantly when two variables are manipulated: (a) the person's conceptualization of a prior event (in this case, failure), and (b) the availability to the person of

Table 10-3

Means and Standard Deviation for Solution Times for TAS X Conditions Interaction (n = 16 per cell)

	Conditions			
	Subject waits	Reassurance	Reassurance plus hints	Hints
	High TAS			
M	2240.9	1980.1	1683.5	1945.9
SD	164.0	149.2	100.3	165.2
	Low TAS			
M	1945.7	1921.4	1818.6	1729.3
SD	108.5	132.1	143.8	130.8

principles useful in approaching a later task. These manipulations lead to adaptive coping behavior because they reduce the potency of self-preoccupying thoughts that interfere with ongoing activities and because they provide direction for the person in approaching a challenging situation. Experimental evidence of the type presented here suggests the potential value of more applied efforts to foster adaptive coping skills in educational, training, and clinical situations.

EDUCATIONAL, TRAINING, AND CLINICAL APPLICATIONS

Applied studies of test anxiety have burgeoned in recent years. Desensitization, implosion, and a variety of study-counseling procedures have frequently been found to reduce test anxiety and facilitate academic performance (Allen, 1973; Jaffe & Carlson, 1972; Spielberger, Anton, & Bedell, 1976). I present below two examples of this work, one an investigation in which the TAS was used as a dependent variable and one in which it was the independent variable.

Gonzalez (1976) conducted a study in which undergraduates who had sought help for their test anxiety were assigned to one of three treatment groups (there was also a no-treatment control group):

1. Desensitization and counseling dealing with study methods
2. Counseling dealing with study methods
3. Relaxation training and study counseling

Table 10-4 presents the pre- and posttreatment TAS means and standard deviations for Gonzalez's groups. It can be seen that the subjects were quite high in test anxiety when their mean TAS scores are viewed in terms of the distributions presented in Figs. 10-1 and 10-2. TAS means showed a significant drop as a function of the three treatment methods used.

An illustration of the TAS as an independent variable in an educational study comes from my own experience as a teacher. The study took place over a 3-year period in an undergraduate personality class I teach. It was stimulated by the tension one perennially observes in students as they take course examinations.

Table 10-4

Pre- and Posttreatment TAS Means and Standard Deviations for College Students Who Sought Help for Their Test Anxiety (Gonzalez, 1976)

	TAS scores	
	Pre	Post
Desensitization and study counseling ($n = 7$)		
Mean	30.00	21.29
Standard deviation	4.32	6.24
Study counseling ($n = 8$)		
Mean	27.62	15.25
Standard deviation	3.38	7.46
Relaxation and study counseling ($n = 7$)		
Mean	24.29	14.43
Standard deviation	4.85	5.32
No treatment ($n = 15$)		
Mean	28.93	29.00
Standard deviation	4.32	3.85

Table 10-5

Means for Regular (First) and No-risk (Second) Tests for Three Classes of Undergraduate Students

	High TAS		Low TAS	
Class (n)	First test	Second test	First test	Second test
1 (10)	32.6	41.6	30.9	33.9
2 (13)	33.1	43.6	32.5	35.4
3 (11)	30.5	40.8	29.4	31.9

Several years ago, after I had returned some graded essay papers to the students, we had a discussion for several minutes about how easy it is to forget relevant material and become mixed up during the tense testing situation. With some feigned innocence I asked: "Well, do you really think you would have performed any better under more relaxed circumstances?" When the crescendo "of course" subsided, I took the bait (or offered it, depending upon how you view it) and proposed that there be another test later in the week. The ground rule was that if a student got a higher grade on the second test, that would be the one entered in the grade book; if the score on the second test was lower, there would be no penalty for the lower performance level.

The students had, a month earlier, participated in an experiment (unrelated to the class) in which they had responded to the TAS. My hunch was that test-anxious students would perform better with the pressure off than under the usual evaluative circumstances. For three successive years, I gave the students a no-risk second chance following the first test. Table 10-5 contains the means for the two scores (the regular and no-risk tests) for three different classes. In each case, TAS scores were divided at the median. The results were analyzed with a repeated measurements design. In each class, there were significant results (.05 level or better) in the same direction. The high TAS students showed greater gains than did the low scorers. There was a marked facilitative effect of the no-risk condition for students relatively high in test anxiety.

I do not offer this study as in any way definitive. It had some methodological inelegancies. For example, I made up the three pairs of tests (maximum score of 50 in every case), and there is no

evidence that a given pair constituted parallel forms. For the second and third classes, but not the first, the pair of tests was made up at the time the first one was given and a flip of the coin determined which would come first. The students were not required to take the no-risk test, although 80 to 90% did so. At the time of scoring the tests, I did not know the student's TAS scores.

The results are consistent with the view that the worry and self-depreciation of the highly test-anxious individual interferes with task performance. When the stimulus for these self-preoccupying thoughts is not present (that is, the evaluative component of tests that is perceived as a personal danger signal) the performance of highly test-anxious individuals improves. These results are consistent with research findings reported by Allen and Desaulniers (1974).

CONCLUSION

Test anxiety can be interpreted as the tendency to view with alarm the consequences of inadequate performance in an evaluative situation. In a sense, the highly test-anxious person creates his or her own problem by processing too much information. The job of processing task-relevant information is complicated by maladaptive personalized feedback ("I'm dumb;" "What if I don't pass this exam?").

We have seen that the deleterious impact of this feedback can be countered in several ways, either through manipulating cues external to the individual (for example, the no-risk test) or through fostering better cognitive and self-control skills (as, for example, what happens when study skills are improved). Cognitive and self-control approaches to anxiety seem especially valuable because everyone at one time or another is forced to react to circumstances over which they have little or no control. Training programs directed toward improving attention and thought are feasible, convenient, and effective. The research reported here, Wine's (1971) work on attentional training, and Holroyd's (1976) study on cognitive treatment of test anxiety all support these conclusions.

REFERENCES

Allen, G. J. Treatment of test anxiety by group-administered and self-administered relaxation and study counseling. *Behavior Therapy*, 1973, *4*, 349-360.

Allen, G. J., & Desaulniers, G. J. Effectiveness of study counseling and desensitization in alleviating test anxiety: A two-year follow-up. *Journal of Abnormal Psychology*, 1974, *83*, 186-191.

Arnold, M. B. *Emotion and personality* (2 vols.). New York: Columbia University Press, 1960.

Ellis, A. *Reason and emotion in psychotherapy*. Secaucus, N.J.: Lyle Stuart, 1962.

Gonzalez, H. P. *The effects of three treatment approaches on test anxiety, study habits and academic performance*. Unpublished master's thesis, University of South Florida, 1976.

Holroyd, K. A. Cognition and desensitization in the group treatment of test anxiety. *Journal of Consulting and Clinical Psychology*, 1976, *44*, 991-1001.

Jaffe, P. G., & Carlson, P. M. Modeling therapy for test anxiety: The role of model affect and consequences. *Behavior Research & Therapy*, 1972, *10*, 329-339.

Janis, I. L. *Psychological stress*. New York: Wiley, 1958.

Klinger, E. Consequences of commitment to and disengagement from incentives. *Psychological Review*, 1975, *82*, 1-25.

Mahoney, M. H. *Cognition and behavior modification*. Cambridge, Mass.: Ballinger, 1974.

Mandler, G., & Sarason, S. B. The effects of prior experience and subjective failure on the evocation of test anxiety. *Journal of Personality*, 1952, *21*, 336-341.

Meichenbaum, D. Cognitive modification of test anxious college students. *Journal of Consulting and Clinical Psychology*, 1972, *39*, 370-380.

Mischel, W. Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, 1973, *80*, 252-283.

Rimm, D. C., & Masters, J. C. *Behavior therapy: Techniques and empirical findings*. New York: Academic, 1974.

Russell, D. G., & Sarason, I. G. Test anxiety, sex, and experimental conditions in relation to anagram solution. *Journal of Personality and Social Psychology*, 1965, *1*, 493-496.

Sarason, I. G. Interrelationships among individual difference variables, behavior in psychotherapy, and verbal conditioning. *Journal of Abnormal and Social Psychology*, 1958, *56*, 339-344.

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

Sarason, I. G. Experimental approaches to test anxiety: Attention and the uses of information. In C. D. Spielberger (Eds.), *Anxiety: Current trends in theory and research* (Vol. 2). New York: Academic, 1972.

Sarason, I. G. Test anxiety and cognitive modeling. *Journal of Personality and Social Psychology*, 1973, *28*, 58–61.

Sarason, I. G. Anxiety and self-preoccupation. In I. G. Sarason & C. D. Spielberger (Eds.), *Stress and anxiety* (Vol. 2). Washington: Hemisphere, 1975, pp. 27–44.

Sarason, I. G., & Stoops, R. *Test anxiety and the passage of time.* Unpublished manuscript, 1976.

Seligman, M. E. P. *Helplessness: On depression, development, and death.* San Francisco: W. H. Freeman, 1975.

Spielberger, C. D., Anton, W. D., & Bedell, J. The nature and treatment of test anxiety. In M. Zuckerman & C. D. Spielberger (Eds.), *Emotions and anxiety: New concepts, methods and applications.* New York: Erlbaum, 1976, pp. 317–345.

Wagaman, G. L., Cormier, W. H., & Cormier, L. S. *Cognitive modification of test-anxious students.* Paper presented at the meeting of the American Educational Research Association, Washington, D.C., 1975.

Wine, J. Test anxiety and direction of attention. *Psychological Bulletin*, 1971, *76*, 92–104.

Zuckerman, M., & Spielberger, C. D. (Eds.). *Emotions and anxiety: New concepts, methods, and applications.* New York: Erlbaum, 1976.