TEST ANXIETY AND DIRECTION OF ATTENTION

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The literature reviewed suggests an attentional interpretation of the adverse effects which test anxiety has on task performance. During task performance the highly test-anxious person divides his attention between self-relevant and task-relevant variables, in contrast to the low-test-anxious person who focuses his attention more fully on the task. This interpretation was supported by literature from diverse areas suggesting that (a) highly anxious persons are generally more self-preoccupied than are people low in anxiety; (b) the self-focusing tendencies of highly test-anxious persons are activated in testing situations; (c) those situational conditions in which the greatest performance differences occur are ones which elicit the self-focusing tendencies of highly test-anxious subjects, and the task-focusing tendencies of low-anxious subjects; (d) research examining the relationship between anxiety and task variables suggests that anxiety reduces the range of task cues utilized in performance; (e) “worry,” an attentionally demanding cognitive activity, is more debilitating of task performance than is autonomic arousal. Treatment and research implications of this attentional interpretation of test anxiety are briefly discussed.

Highly test-anxious persons typically perform more poorly on tests than do low-test-anxious persons, particularly when the tests are administered under stressful, evaluative conditions. The literature reviewed in this article suggests that this performance difference is largely due to a difference in the attentional focuses of high- and low-test-anxious persons during task performance. The low-test-anxious person is focused on task-relevant variables while performing tasks. The highly test-anxious subject is internally focused on self-evaluative, self-deprecatory thinking, and perception of his autonomic responses. Since the difficult tasks on which the test-anxious person does poorly require full attention for adequate performance, he cannot perform adequately while dividing his attention between internal cues and task cues.

Marlett and Watson (1968) have stated this proposition rather well:

The high-test-anxious person spends a part of his task time doing things which are not task oriented. He worries about his performance, worries about how well others might do, ruminates over choices open to him, and is often repetitive in his attempts to solve the task. Any effort to overcome the self-defeating kind of behavior which the high-anxious person exhibits should concentrate on allowing him to perform without the constraints which maximize the negative effects of the avoidance behavior [p. 203].

TEST ANXIETY THEORY AND MEASUREMENT

The ideas presented above are restatements of test anxiety theory as advanced by its originators (Mandler & Sarason, 1952) and later contributors. Test anxiety theory was initially presented by Mandler and Sarason in their article introducing the Test Anxiety Questionnaire (TAQ). In contrast to general anxiety scales such as the Taylor Manifest Anxiety Scale (MAS; Taylor, 1953), the TAQ was constructed as a measure of anxiety proneness in a specific kind of stressful situation—the testing situation. It was expected that items which related specifically to the subject’s reactions to testing situations would be more predictive than general anxiety scales of his behavior in these situations.

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It was assumed that two kinds of drives are evoked in the testing situation. The first of these are learned task drives, which are reduced by “responses or response sequences which lead to completion of the task [Mandler & Sarason, 1952, p. 166].” The second kind is a learned anxiety drive, which can elicit two classes of responses: those related to task completion, which are anxiety reducing, and those which interfere with task completion. This latter response class is the one which the TAQ was constructed to measure: These responses . . . may be manifested as feelings of inadequacy, helplessness, heightened somatic reaction, anticipations of punishment or loss of status and esteem, and implicit attempts at leaving the test situation. It might be said that these responses are self rather than task centered [p. 166].

The task-relevant responses are ones which are specific to the task, and must be learned during task performance. The self-oriented responses are a class of generalized responses which are readily evoked in a task situation, and interfere with the learning of specific task-relevant responses. The TAQ, a 37-item questionnaire in a rating-scale format, is designed to measure these self-oriented responses. The items refer to the kinds of internal responses typically experienced by the subject immediately before and during examinations and tests.

I. Sarason (1958a) constructed a 21-item measure of test anxiety, which he labeled the Test Anxiety Scale (TAS). It is based largely on items taken from Mandler and S. Sarason’s TAQ rewritten for a true-false format. The TAQ and the TAS are highly correlated, product-moment correlation = .93 (I. Sarason, Pederson, & Nyman, 1968). I. Sarason has restated the interfering response hypothesis, emphasizing that it is a habit interpretation of anxiety:

This interpretation, briefly put, states that Ss scoring high and low in anxiety differ in the response tendencies activated by personally threatening conditions. Whereas low scoring Ss may react to such conditions with increased effort and attention to the task at hand, high scoring Ss respond to threat with self-oriented, personalized responses [1960, p. 405].

As Sarason noted, the attentional focuses of high- and low-anxious subjects differ when under threat. The low-anxious subjects turn their attention to the task, while high-anxious subjects attend to their internal self-anxious responses.

Alpert and Haber (1960) constructed a test anxiety questionnaire, the Achievement Anxiety Test (AAT), which yields two measures. One of these is a 10-item debilitating anxiety scale, a construct similar to that measured by the TAQ and TAS. Total scores on the scale correlated .64 with total TAQ scores. The other measure is labeled facilitating anxiety. Mandler and S. Sarason (1952) had theorized that test anxiety is debilitating of performance only among subjects who had learned a habitual class of interfering responses to the test anxiety. Among persons without this class of interfering responses, test anxiety elicits task-relevant responses leading to task completion. Persons scoring low on the TAQ were implicitly assumed by Mandler and Sarason to be high in the facilitating kind of anxiety. Alpert and Haber’s AAT measures separately the two constructs of anxiety and their associated responses. The nine items on the facilitating anxiety scale are based on “a prototype of the item—‘Anxiety helps me to do better during examinations and tests [p. 213].’” The facilitating and debilitating scales correlated —.48 with each other (Alpert & Haber, 1960).

Throughout this review, the terms “high test anxious” and “low test anxious” refer to persons who score at the high and low extremes of measures of debilitating test anxiety, such as the TAQ, TAS, or debilitating anxiety scale of the AAT.

Self-Focusing Tendencies of High-Anxious Subjects: Empirical Evidence

In a review of the literature on paper-and-pencil anxiety scales, I. Sarason (1960) cited a number of studies that provide evidence that high-anxious subjects are “more self-deprecatory, more self-preoccupied, and generally less content with themselves than subjects lower in the distribution of anxiety scales [p. 404].” This conclusion was primarily based on the results of studies which reported relationships between scores on anxiety scales and other paper-and-pencil personality measures. In general, these investigations
indicated that persons who score high on anxiety scales describe themselves in negative, self-devaluing terms on other pencil-and-paper measures as well.

Two of the studies reviewed in this connection by I. Sarason reported relationships between test anxiety and responses of subjects in experimental situations. In one of these (Doris & S. Sarason, 1955) subjects differing in TAQ scores were arbitrarily failed on a number of tasks. Following the tasks, the subjects were required to rank order "blame statements," which included "self-blame" and "other-than-self" blame items. Highly anxious subjects blamed themselves for their failures significantly more than did low-anxious subjects. In the other study, Trapp and Kausler (1958) compared Wechsler-Bellevue digit-symbol performance and levels of aspiration of high- and low-test-anxious subjects. Through the actual performance of the high- and low-TAQ groups did not differ, the levels of aspiration of high-anxious subjects became progressively lower over the four trials. On the last two trials, the high-test-anxious subjects had significantly lower level-of-aspiration scores than the low-anxious subjects. Though they did not objectively perform more poorly than the low-TAQ subjects, the high-anxious subjects progressively became more pessimistic about their performance over the four trials.

A more recent study by Meunier and Rule (1967) reported results leading to similar conclusions regarding the test-anxious person's tendency to devalue his own performance. The effects of positive, negative, or no feedback on the subjects' confidence in their judgments of the length of lines were investigated. On no-feedback trials, highly test-anxious subjects rated their confidence level as low and comparable to their confidence on trials with negative feedback. In contrast, low-test-anxious subjects expressed high confidence in their judgment on no-feedback trials, and this level of confidence corresponded to the level expressed on positive feedback trials.

Since publishing his review of anxiety scale studies, I. Sarason has completed several studies which further indicate the self-deprecatory, self-ruminative tendencies of highly test-anxious subjects (Sarason & Ganzer, 1962, 1963; Sarason & Koenig, 1965). In each of these studies, an unstructured verbal conditioning paradigm was used with college students who scored at the extremes of the TAS. The subjects were required to describe themselves orally for approximately one-half hour. Nonreinforcement, reinforcement of negative self-references, and reinforcement of positive self-references have been compared. Some of the conclusions from these experiments are: (a) Regardless of experimental condition, highly test-anxious subjects generally describe themselves in more negative terms than do low-test-anxious subjects. (b) High-test-anxious subjects are extremely responsive to reinforcement when the response class being reinforced is negative self-references. (c) However, when the response class being reinforced is positive self-references, high-anxious subjects do not condition. That is, they do not produce more positive self-references as a result of being verbally reinforced for them.

The conclusion that high-anxious persons are, indeed, generally self-deprecatory and self-preoccupied seems inescapable in light of the research evidence. But whether these self-focusing tendencies are specifically activated in testing situations is a question which has not been answered in the studies reviewed to this point. Four recent studies (Ganzer, 1968; Mandler & Watson, 1966; Marlett & Watson, 1968; Neale & Katahn, 1968) provide evidence bearing directly on this proposition.

In the earliest of these studies, Mandler and Watson (1966) administered a series of digit-symbol tasks to extreme low- and high-TAQ groups. A posttask questionnaire included the question, "How often during the testing did you find yourself thinking how well, or how badly, you seemed to be doing? [p. 276]." On a 10-point rating scale, high-test-anxious subjects indicated markedly greater occurrence of such thoughts than did the low-test-anxious group. In a partial replication of this study, Neale and Katahn (1968) reported identical results on this questionnaire item.

Marlett and Watson (1968) reported a similar result. Ninth-grade males in high- and low-extreme groups on the children's form of the Alpert-Haber Achievement Anxiety Test
ANXIETY AND ATTENTION

(Stanford, Dember, & Stanford, 1963) were arbitrarily failed for 12 trials on a button-pressing task. A posttask questionnaire included the question, “How often did you think about how well or badly you were doing?” The ends of the rating scale were labeled “I didn’t think about it,” and “I thought about it so much I couldn’t concentrate [pp. 202–203].” The scores of high-test-anxious subjects indicated that they were significantly more disturbed by such self-focused thoughts.

Even more direct evidence for the activation of self-oriented tendencies among high-anxious subjects in test situations is provided in the study reported by Ganzer (1968). The effects of audience presence and test anxiety (TAS) on the serial verbal learning of female subjects were investigated. Tabulations were made of the frequency and content of all of the subjects’ task-irrelevant comments while they were working on the task. “High TAS scorers, especially in the Observed condition, emitted more than any other group. Content analysis revealed that the comments were mostly of a self-evaluative or apologetic nature | Ganzer, 1968, p. 194].”

In summary, there is abundant evidence that the test-anxious person is more self-preoccupied and self-deprecatory than his low-test-anxious counterpart. It is also clear, in view of the research reviewed, that these self-focused tendencies are activated by the pressures of the testing situation.

SITUATIONAL CONDITIONS AND THE TASK PERFORMANCE OF HIGH- AND LOW-TEST-ANXIOUS SUBJECTS

The two initial studies published by the authors who originated test anxiety theory (Mandler & S. Sarason, 1952; S. Sarason, Mandler, & Craighill, 1952) were prototypes of the many subsequent investigations of situational stress variables and test anxiety. The general predictions of test anxiety theory with regard to situational stress variables are:

When a stimulus situation contains elements which specifically arouse test or achievement anxiety, this increase in anxiety drive will lead to poorer performance in individuals who have task-irrelevant responses in their response repertory. For individuals without such response tendencies, these stimulus elements will raise their general drive level and result in improved performance. (Such elements would be any reference that the individual is being judged, a statement of expected performance, etc.) [Sarason et al., 1952, p. 561].

Mandler and Sarason (1952) examined the effects of feedback and no-feedback on the performance of subjects scoring at extremes on the TAQ. As predicted, the two feedback conditions, both success and failure, facilitated the performance of low-TAQ subjects, and interfered with the performance of high-TAQ subjects. In the second study (Sarason et al., 1952) similar predictions were made concerning an instructional manipulation. In the stressful “ego-involving” instructional condition, subjects were told that they should easily complete the test within the time limit, when it was, in fact, made impossible for them to do so. This “expected-to-finish” condition can be described as an advance failure manipulation. The nonstressful instructions, “not-expectd-to-finish,” informed the subject that no one could expect to finish within the time limit. In general, the high-TAQ subjects did better following the “not-expected-to-finish” than the “expected-to-finish” instructions, while the reverse was true for the low-anxious subjects.

The many subsequent investigations of stressful situational conditions and test anxiety have generally provided data consistent with the predictions of test anxiety theory (Cox, 1966, 1968; Harleston, 1962; Paul & Eriksen, 1964; Russell & I. Sarason, 1965; I. Sarason, 1958b, 1959, 1961; I. Sarason & Harmatz, 1965; I. Sarason & Minard, 1962; I. Sarason & Palola, 1960). Most of these studies have investigated the effects of feedback or instructional manipulations, though three were concerned with the effects of audience presence on task performance (Cox, 1966, 1968; Ganzer, 1968). Considering audience presence as a source of threatening evaluation, the results of both studies support the predictions of test anxiety theory. Audience presence debilitated the task performance of high-test-anxious subjects, and facilitated the performance of low-test-anxious subjects.

Instructional variations, other than those discussed above, have most frequently involved comparisons of (a) “ego-involving,”
“highly motivating” instructions, which inform the subject that his task performance will reflect his ability, (b) minimal task instructions, and (c) instructions which assure the subject that his task performance will not be used to evaluate him. Frequently, the subject is told that his performance will be anonymous. He may be instructed that the experimenter is interested only in properties of the task, or that his performance is important only so that the experimenter may complete the study.

The results of studies varying instructional conditions have generally reported an interaction between level of test anxiety and evaluation emphasis: (a) Highly test-anxious subjects perform more poorly following highly evaluative “ego-involving” instructions than nonevaluative “anonymous” instructions while the reverse is true for low-test-anxious subjects. (b) Following highly evaluative instructions, low-test-anxious subjects perform better than high-test-anxious subjects; following nonevaluative instructions, high-test-anxious subjects perform better than low. (c) Following minimal task instructions, high- and low-test-anxious subjects perform at about equivalent levels, intermediate between their performances in the highly evaluative and nonevaluative conditions.

All of the situational conditions which differentially affect the performance of high- and low-anxious subjects vary on evaluative dimension—the degree to which the subject believes that he is being or will be evaluated on the basis of his task performance. Conditions at the extremes of the dimension affect the performance of high- and low-test-anxious persons in opposing ways. It might also be noted that situational conditions varying on this evaluative dimension have opposing effects on the direction of attention of high- and low-test-anxious persons. Highly evaluative conditions cause the highly test-anxious person to direct his attention internally rather than to the task. The same conditions cause the low-test-anxious person to increase his “attention to the task at hand [I. Sarason, 1960, p. 405].” Nonevaluative situational conditions do not elicit the highly test-anxious subject’s self-directed interfering responses, thus it is possible for him to direct his full attention to the task. Conversely, non-evaluative testing conditions presumably do not excite the nonanxious subject’s motivation and interest. Though it cannot be said that he therefore turns his attention inward, it is probable that his low interest in the task is accompanied by less than full attention to it.

I. Sarason (1958b) has investigated another instructional variation, which he labeled a “reassurance” condition. These instructions, like the nonevaluative ones discussed above, were designed to improve the performance of high-test-anxious subjects rather than interfere with it. In spite of the “reassurance” label, these instructions can most accurately be described as neutral with respect to the evaluative dimension, since there was no reference in them to evaluation of the subject’s performance. Their nature might more accurately be described as information-giving and attention-directing. The subject’s task was to learn a serial list of nonsense syllables. Following the standard serial learning task instructions, the subject was warned that many people become tense when learning this kind of task and that he should expect his progress to be slow. He was further told that he should concentrate on the list rather than worrying about how he was doing. When this set of instructions was compared to standard or minimal task instructions, high-test-anxious subjects performed better following the reassurance instructions. The reassurance condition was detrimental to the performance of the low-test-anxious subjects, in comparison to the standard task instructions. Sarason’s study suggests that it may not be necessary to resort to removing the evaluative emphasis from the highly anxious subject’s performance in order to improve it. The results indicate that it may be sufficient to substitute task-relevant responses for the self-orienting ones by means of rather straightforward attention-directing instructions.

ANXIETY AND RANGE OF CUE UTILIZATION

It was suggested in the preceding section that evaluative testing conditions have opposite effects on the attentional focuses of high- and low-test-anxious persons. When being evaluated, the high-test-anxious person turns his attention inward while the low-test-
ANXIETY AND ATTENTION

anxious person focuses more fully on the task. The implication is that the high-test-anxious person attends to fewer task cues than does the low-test-anxious person. This attentional interpretation of the effects of test anxiety on task performance is consistent with an empirical generalization advanced by Easterbrook (1959) concerning the relationship between arousal level and task variables. He reviewed a large body of research which indicated that emotional arousal consistently narrows the range of cue utilization in task performance.

The following are examples of the research Easterbrook cited to support this generalization: (a) Studies of the effects of experimentally manipulated drive level on response to a focal task, and simultaneous response to peripheral, only occasionally relevant stimuli. Arousal reduces responsivity to the peripheral stimuli, while maintaining or improving central performance (Bahrick, Fitts, & Rankin, 1952; Bursill, 1958; Davis, 1948; Easterbrook, 1953). (b) Studies of the effects of emotional arousal on measures of incidental learning. Again arousal reduces the amount of incidental learning, while having no effect on or improving intentional learning (Aborn, 1953; Bahrick, 1954; Bruner, Matter, & Papanek, 1955; Johnson, 1952; Kohn, 1954; Silverman, 1954; Silverman & Blitz, 1956). These are only a few of the studies cited by Easterbrook in support of his formulation.

Easterbrook's definition of emotional arousal is very broad:

the innate response to a state of biological deprivation or noxious stimulation, which underlies or occurs simultaneously with overt action and affects its strength and course. This emotional arousal is greater in neurotic than in normal subjects, greater than usual in subjects under stress or threat or in frustration, and in general greater in animals that have been "motivated" by any of the usual deprivations, noxious stimulations, or other incentives than it is in unmotivated or resting animals of the same species [p. 184].

Anxiety is one aspect of this emotional arousal dimension, and several of the studies reviewed by Easterbrook indicate that narrowing the range of cue utilization accompanies anxiety arousal.

Since Easterbrook's review, several studies have reported the effects of experimentally

aroused anxiety on range of cut utilization in task performance (Agnew & Agnew, 1963; Bruning, Capage, Kozuh, Young, & Young, 1968; Tecce & Happ, 1964; Wachtel, 1966, 1968). The results of these investigations have been consistent with Easterbrook's formulation. Stressful situational conditions tended to reduce the range of cue utilization, in comparison to nonstressful conditions. No measures of individual differences were used in these studies.

Zaffy and Bruning (1966), West, Lee, and Anderson (1969) and Wachtel (1966, 1968) reported relationships between scale-measured anxiety level and range of cue utilization. Zaffy and Bruning selected subjects from extreme scorers on the Taylor MAS. Rather than varying range of cues, they made the available cues either relevant or irrelevant to task performance. The subjects' task was to learn a correct position for each of 19 presentations of 5 zeros, presented by a memory drum. In the relevant cue condition the zeros were numbered in order with subscripts from 1 to 5; the same subscripts were used in the irrelevant cue condition but in random order. These conditions were compared to a no-cue control condition. The performance of the low-MAS subjects was affected more by the presence of the cues, whether relevant or irrelevant, than was the performance of the high-MAS subjects. Within the low-MAS anxiety level, there were differences significant beyond the .001 level in all three of the comparisons of the three conditions, with superior performance in the relevant cue condition, intermediate performance in the no-cue condition, and poorest performance in the irrelevant cue condition. The performance levels of the high MAS subjects followed the same order, but there was a significant difference only between the relevant and irrelevant cue conditions (p < .025).

More pertinent to the purposes of this review are the studies reported by West et al. (1969) and Wachtel (1966, 1968), since they selected subjects on the basis of their scores on measures of test anxiety. West et al. used sixth and eighth graders who were high and low scorers on the Test Anxiety Scale for Children (TASC; S. Sarason, Davidson, Lighthall, Waite, & Ruebush, 1960). The task
was made up of arithmetic problems. There were two conditions determined by the nature of the information given in the problems. In one condition only information essential to solution of the problems was given; in the other condition the same relevant information was provided, but additional irrelevant information was given in each problem. The interaction between anxiety level and condition was significant. Both high- and low-TASC groups performed more poorly in the irrelevant information condition. No tests of significance for individual pairs of means were reported; the means for the groups indicate that the performance level of the low-TASC group was affected more by the addition of irrelevant cues than was the performance level of the high-TASC group: low TASC, relevant information only, $\bar{X} = 33.4$, relevant plus irrelevant, $\bar{X} = 23.8$; high TASC, relevant only, $\bar{X} = 27.3$, relevant plus irrelevant, $\bar{X} = 24.4$. The low-test-anxious children were more sensitive to the addition of irrelevant cues than were the high-test-anxious children.

Wachtel's study (1966, 1968) reported relationships between test anxiety level and range of cue utilization in task performance on a central continuous tracking task and reaction times to two occasional peripheral lights. A control condition with minimal task instructions was compared with three experimental conditions: (a) Subjects told that unavoidable electric shock would be administered during task performance; (b) an avoidable shock condition in which subjects were informed that they could avoid shock if their combined performance on the central and peripheral tasks remained high; (c) a personality diagnostic condition in which the task was presented as a means of evaluating the subject's personality; the subject was told that the peripheral lights would go on only if his performance fell below an acceptable level.

Though Wachtel's study was primarily focused on the effects of experimentally manipulated anxiety and test anxiety in this study combines Easterbrook's attentional formulation and the interfering response hypothesis of the test anxiety theorists: "when an individual is anxious, attention is diverted inward to perception of his anxiety and therefore less attention is available for external stimuli [Wachtel, 1966, p. 2149]."

WORRY AND EMOTIONALITY: COMPONENTS OF TEST ANXIETY

Liebert and Morris (1967) have presented an analysis of test anxiety which is quite consistent with the one proposed in this paper. They suggest that test anxiety is composed of two major aspects: worry and emotionality. The worry (W) component is described as cognitive concern over performance, and emotionality (E) is the autonomic arousal aspect of anxiety. Liebert and Morris devised a brief situational measure of W and E based on TAQ items. The results of a series of studies (Doctor & Altman, 1969; Liebert & Morris, 1967; Morris & Liebert, 1969, 1970; Spiegler, Morris, & Liebert, 1968) suggest
that scores on the two components vary predictably with temporal relationships to classroom examinations and with performance expectancies. The scale has been administered several days before an examination, immediately before, and immediately after. Scores on W tend to be fairly constant across time; while E scores reach a peak immediately before an examination, falling off rapidly immediately after the examination. W scores are significantly and negatively correlated with subjects' preexamination ratings of performance expectancy, while E scores are not related to performance expectancy.

Three studies in this series have yielded results on the relationship between worry and emotionality and task performance (Doctor & Altman, 1969; Morris & Liebert, 1969, 1970). Morris and Liebert (1969) devised another paper-and-pencil measure of the two anxiety components, this one composed of items from the Taylor MAS. The performance measure was a total of five Wechsler Adult Intelligence Scale (WAIS) subtests. A 2 x 2 factorial design was used: half of the subjects completed only the easy items in each subtest, half the difficult items; half of the subjects were aware of being timed, half were not. There were significant interactions between worry scores and both task difficulty and timing in their effects on total WAIS scores. There were no significant results involving emotionality and task performance. The authors suggest that "it is worry, not 'anxiety,' which affects performance on intellectual-cognitive tasks and which interacts with the relevant variables of the test situation [pp. 243-244]."

Doctor and Altman (1969) examined the relationships between W and E scores on Liebert and Morris' (1967) scale and final examination grades in a psychology course. W scores were found to be significantly and negatively related to exam performance. E scores were negatively related to performance only among subjects below the group median W score. When W was high, the addition of E had little or no effect on performance.

Morris and Liebert (1970) reported similar results in two studies, one involving college undergraduates, the other, high school students. Partial correlations were computed between worry and emotionality scores on the Liebert-Morris (1967) scale, which was administered immediately before a course final examination and examination grades. In both studies, partial correlations between worry scores and final examination grades were negative and significant. Partial correlations between emotionality scores and grades were nonsignificant.

The worry component seems closely related to an attentional interpretation of test anxiety, which proposes that the adverse effects of test anxiety are due to attention being divided between self and the task. Worry has been described as "preoccupation with performance [Doctor & Altman, 1969, p. 564]," "cognitive concern about the consequences of failing, the ability of others relative to one's own, etc. [Liebert & Morris, 1967, p. 975]," "cognitive or intellectual concern about one's own performance [Spiegler et al., 1968, p. 451]." These descriptions all refer to attentionally demanding cognitive activity going on during task performance. This is not to say that autonomic activity is not demanding of attention as well, but it is less likely to require attention except "at high levels where physiological reactivity might be distracting and annoying [Doctor & Altman, 1969, p. 364]."

Conclusions and Implications

The literature reviewed supports an attentional interpretation of the debilitating effects of test anxiety on task performance. The highly test-anxious person responds to evaluative testing conditions with ruminative, self-evaluative worry and, thus, cannot direct adequate attention to task-relevant variables. An attentional analysis is closely related to existing theories of test anxiety. Mandler and Sarason's (1952) original theoretical position assumed that anxiety interferes with the performance only of subjects who have a habitual class of self-oriented interfering responses in their response repertoires. For subjects without this class of interfering responses, anxiety may facilitate task-relevant responses. Alpert and Haber's Achievement Anxiety Test was designed to provide independent measures of these two classes of response to test anxiety. Liebert and Morris'
(1967) analysis of test anxiety into the two components of worry and emotionality is a logical extension of test anxiety theory. Emotional arousal appears to bear no consistent relationship to performance on intellectual or cognitive tasks, while worry is consistently and negatively related to performance. An attentional interpretation states simply that the reason "worry" debilitates task performance is that it is attentionally demanding and distracts attention from the task.

Before moving into specific research and treatment applications, a few implications of the attentional analysis of test anxiety are stated below:

1. An attentional approach is explicitly concerned with how the subject uses his task time—his cognitive activity, what he is thinking about and attending to.

2. This approach implies little interest in autonomic arousal per se. In this context, degree of arousal is irrelevant unless the subject is attending to his arousal. Of course, as noted earlier, when arousal becomes quite extreme, it is attentionally demanding.

3. Finally, this analysis implies that the test-anxious person’s performance may be improved by directing his attention to task-relevant variables, and away from self-evaluative rumination.

Experimental Applications

Though test anxiety theorists have not viewed test anxiety as a unitary dimension of emotional arousal, the experimental studies in this area have typically been concerned with manipulations of the evaluative situational conditions which evoke test anxiety. With two notable exceptions (Sarason et al., 1968; Sieber, 1969) studies have not investigated conditions designed to alter the interfering responses elicited by the anxiety. Research manipulating evaluative conditions has been necessary in order to establish test anxiety as a theoretical construct and to validate measures of test anxiety. These goals have been realized; it seems reasonable to suggest that an appropriate next stage for research in this area is one in which the evaluative dimension is held constant, and in which a search is begun for variables that will alter the test-anxious subjects’ interfering responses.

An attentional analysis of test anxiety can provide some direction to such a search.

There is a large body of literature in selective attention, which has recently been reviewed by Egeth (1967). The basic premise of the studies in this research area is that subjects’ attention can be differentially directed to specific stimuli or stimulus attributes and away from others. The nature of the mechanisms involved, the completeness of the selectivity, and the level at which the selection takes place are matters of some dispute (e.g., Broadbent, 1958; Deutsch & Deutsch, 1963; Treisman, 1964). It is, however, empirically established that persons can be instructed to be selectively more attentive to specific stimulus attributes or dimensions and to be less attentive to others. Moreover, with repeated training under attention-directing instructions, subjects become more and more skilled in attending to the "relevant" stimuli and ignoring the "irrelevant" stimuli.

The selective attention literature has not been concerned with individual differences. There is no evidence, therefore, on how test-anxious persons might respond to attention-directing instructions. There is a good deal of evidence, however, which indicates that highly test-anxious persons are very responsive to social cues of all sorts, including verbal reinforcement (I. Sarason & Ganzer, 1962, 1963) modeling cues (I. Sarason et al., 1968), persuasion (Janis, 1955), and conformity pressures (Meunier & Rule, 1967), as well as evaluative instructional manipulations. It seems a plausible hypothesis that test-anxious subjects should be susceptible to attentional instructions directing them to selectively attend to task-relevant variables and to ignore self-relevant variables.

Instructional manipulations are the most obvious means of directing subject’s attention to task-relevant variables, but they are not the only available means. For example, modeling has been demonstrated as a very effective means of transmitting new behavior (e.g., Bandura, 1969; Bandura & Walters, 1963). I. Sarason et al (1968) and I. Sarason (1968) have reported studies suggesting that the verbal learning of highly test-anxious subjects is facilitated by prior exposure to businesslike live models learning similar serial
lists. The use of models who transmit task-attending, nonworrying cues may be an effective technique for other kinds of learning situations.

Task cues themselves may provide another means of manipulating the attention of test-anxious subjects. Sieber (1969) has reported a study in which high- and low-test-anxious children worked on a multistage task. In one condition, they were provided with visual displays of all of the earlier stages of the task; in another condition, there were no displays. The highly test-anxious children performed better in the visual display than the no-display condition, while the displays had no differential effect on the performance of the low-test-anxious children. Sieber described the displays as "memory supports." They might also be described as means of sustaining attention to task-relevant variables. It should be possible to develop such "memory-supporting" or "attention-sustaining" techniques for use with other tasks and age levels.

To this point, the research possibilities discussed have been concerned only with means of manipulating the attention of highly test-anxious persons. These suggestions do not exhaust the research possibilities implied by an attentional approach. The approach also suggests analysis of other areas, for instance, research designed to examine in detail the manner in which high- and low-test-anxious persons deploy their attention during task performance. Such research would inevitably lead to concern with the properties of specific tasks and the attentional demands they make on subjects.

Treatment Applications

The purpose of this section is not to review in any detail the treatment literature in test anxiety, but rather to suggest possible treatment techniques which might be derived from an attentional approach. The approach also suggests analysis of other areas, for instance, research designed to examine in detail the manner in which high- and low-test-anxious persons deploy their attention during task performance. Such research would inevitably lead to concern with the properties of specific tasks and the attentional demands they make on subjects.
subjects in the attentional training condition changed positively and significantly on self-report measures of test-related anxiety, as well as on two standardized performance measures. The performance measures were Forms 1 and 2 of the Wonderlic Personnel Tests (Wonderlic, 1959) and matched forms of a digit-symbol test. The attentional training plus relaxation also produced positive changes, but added nothing beyond attentional training alone. Subjects in the self-explorational condition did not change significantly on any measures.

A larger, more adequate treatment study is being planned for the near future. Though the results of this pilot study are no more than suggestive, one of the suggestions is that attentional training not only improves task performance but lowers reported test anxiety level as well. In conclusion, perhaps it is possible to define test anxiety attentionally. If a person is not attending to his test anxiety, it, in effect, does not exist. "My experience is what I agree to attend to [William James, 1890, p. 403]."

The digit-symbol tests were selected from a battery of eight, constructed and standardized by Marvin Brown, University of Waterloo, 1968.

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