# DIFFERENTIAL RESPONSIVENESS OF REPRESSORS AND SENSITIZERS TO STRESS

by

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# INTRODUCTION

Since its introduction, the Repression-Sensitization (R-S) scale (Byrne, 1961; Byrne, Barry, & Nelson, 1963) has inspired a substantial body of research involving a wide range of variables. Early investigations were concerned with perceptual defense, and it was this body of research which laid the foundation for the conceptualization of the repression-sensitization dimension and the construction of a scale to reliably measure it. In recent years, however, the validity of the R-S scale has been called into question due to consistent evidence of a high positive correlation with measures of trait anxiety (e.g., Abbott, 1972). But any possible relationship between repression-sensitization and trait anxiety has yet to be demonstrated behaviorally. A closely related question is whether repressors and sensitizers show differential arousal in the anticipation of stress as opposed to the actual experience of stress (Scarpetti, 1973). These issues, in combination, have potentially wide-ranging implications of both a theoretical and practical nature. The present study was designed to simultaneously assess both questions in an experiment employing a variety of response measures.

## A. Early Research

The initial research which ultimately led to the unidimensional categorization of repression and sensitization as personality variables was undertaken in an attempt to investigate the phenomenon of perceptual defense. Perceptual defense was conceived as an unconsciously motivated, anxiety-reducing activity by which the organism perceptually adapts itself to threatening stimuli. Bruner and Postman (1947a), in

the most historically important statement on the subject, set forth the underlying assumptions in the following manner:

Perception is a form of adaptive behavior. Its operation reflects not only the characteristics of sensorineural processes, but also the dominant needs, attitudes, and values of the organism. For perception involves a selection by the organism of a relatively small fraction of the multiplicity of potential stimuli to which it is exposed at any moment in time. In perception, moreover, certain stimuli are accentuated and vivified at the expense of others. Finally, what is 'habitually seen' in any given perceptual situation is a function of the fixation of past perceptual responses in similar situations. Through these three processes--selection, accentuation, and fixation--the adaptive needs of the organism find expression in perception (p. 300) . . . Adaptive factors in perception are not limited to unstable stimulus situations (p. 307).

It was initially believed that perceptual defense involved only the "repression" of responses to threatening stimuli. That is, it was thought that the organism selected, accentuated, and fixated upon only those stimuli which would permit the avoidance of anxiety, i.e., non-threatening or neutral stimuli, and would effectively ignore any threatening or anxiety-inducing stimuli (Postman, Bronson, & Gropper, 1953). However, it soon became apparent that profound individual differences existed in response to threat. In addition to the expected "repression" mode of defense, research revealed a second defensive strategy, a "sensitizing" process by which subjects evinced a significantly greater willingness to respond to threatening material, i.e., they appeared to

be more "sensitive" to such material relative to nonthreatening or neutral stimuli. Some years later, these two classes of individuals were termed "repressors" and "sensitizers," respectively (Gordon, 1957).

The first investigation to report individual differences in defensive strategies was conducted by Bruner and Postman (1947b). The purpose of the experiment was not to study individual differences in reaction to threat, for no such phenomenon had been previously indicated, but rather to compare associative reaction time and speed of recognition to threatening words as methods by which perceptual defense might be operationalized. Toward this end, the authors obtained reaction times for free associations to each of 99 stimulus words, most of which were emotionally-charged (e.g., "penis," "death," "bitch," "anger"). Each subject's fastest, midmost, and slowest reaction times were calculated and, two weeks later, the six primary words in each category were presented to the subject on a tachistoscope at increasingly slower exposure speeds until each word was correctly recognized. Results showed that, as predicted, associative reaction time and speed of recognition were significantly related in ability to measure repression in perceptual defense. However, another response pattern also emerged. One group of subjects showed a <u>faster</u> recognition time to the most anxiety-provoking words, a phenomenon which the authors termed a "sensitizing process" manifested in "perceptual vigilance." Although the concept of perceptual vigilance was not a novel one, having been observed in relation to need reduction (Bruner & Goodman, 1947) and value systems (Postman, Bruner, & McGinnies, 1948), the concept of sensitization to threat, with

its implication of individual differences in perceptual defensive behavior, was an intriguing notion which engendered an upsurge of research interest.

One of the most active areas of early research involving the bimodal perceptual response to threat was concerned with the use of projective instruments as measurement devices and, by implication, the "unconscious" nature of perceptual defense. A typical study was reported by Eriksen (1951). Using 28 white male hospitalized psychiatric patients as subjects, the author presented them with eight drawings having aggressive themes at 13 different speeds on a tachistoscope. Subjects described each drawing at each of the 13 speeds. Two to four weeks later, subjects were administered 10 Thematic Apperception Test (TAT) cards containing ambiguous aggressive themes. The amount of aggression present in the TAT stories was correlated with recognition of aggression in the drawings. As expected, results showed two distinct patterns of response. Subjects displaying low recognition thresholds for aggressive stimuli (i.e., those who recognized the aggressive themes of the drawings at relatively higher tachistoscopic speeds) gave more TAT stories in which aggression was one of the main themes than did subjects with higher recognition thresholds. These groups were termed "perceptual sensitizers" and "perceptual defenders," respectively. Clinically, perceptual defenders gave substantial evidence of unconscious resistance to aggression in TAT responses, including blocking, inaccurate interpretation, and incoherent and unelaborated stories. The author concluded that the data supported both the notion of individual differences in response to threat and the unconscious nature of the response. A subsequent study

by Nelson (1955), which employed a similar design, demonstrated the utility of the Blacky Pictures Test, another projective instrument, in differentiating repressors and sensitizers in response to stimulation having sexual and aggressive content. Other early investigations yielding positive results for projective techniques in discriminating the repression-sensitization dimension as a function of threat were reported by Carpenter, Weiner, and Carpenter (1956), using a sentence completion task, and by Kissin, Gottesfeld, and Dickes (1957), who employed the Rorschach and Machover Figure Drawing tests.

More objectively defined personality traits were also found to be related to the repression-sensitization dimension. For example, Shannon (1962) hypothesized that "Externalizers" and "Acter-Outers," as defined by a number of clinical criteria, would report lower recognition thresholds for words relating to sex, aggression, and dependency than would "Internalizers." Fifty-one adult male hospitalized psychiatric patients were presented with threatening words on slides and permitted to adjust degree of illumination in fixed steps to the point of recognition. All subjects were approximately equal in visual acuity. Results showed that Externalizers required less illumination to recognize threatening words than Internalizers, thereby confirming the author's hypothesis. It was concluded that Externalizers react in a sensitizing manner to threat, whereas Internalizers tend to repress or ignore threatening stimuli.

Another personality dimension which was found to be related to repression-sensitization was authoritarianism (cf. Adorno, Frenkel-Brunswik, Levinson, & Sanford, 1950). Kogan (1956), using an auditory

rather than a visual stimulus, exposed authoritarian and non-authoritarian (normal) subjects to tape-recorded sentences containing sexual and aggressive themes and partially masked by white noise. Authoritarianism was measured by the E and F scales of the California Test of Mental Maturity. Subjects were required to reproduce the sentences in writing. The sentences were then scored by a blind rater on a 0-4 scale of recognition. Results showed that authoritarian subjects had lower recognition scores, suggesting stronger repressive tendencies in these individuals. However, no sensitizing process was reported, presumably because subjects having lower-than-normal authoritarianism scores were not included.

Other early studies also demonstrated the utility of threatening auditory stimulation in differentiating repressors and sensitizers. For example, Lazarus, Eriksen, and Fonda (1951) recorded sentences containing sexual, aggressive, or neutral themes and played them back on headphones to 35 "literate neurotics" at a Veterans Administration outpatient clinic. Auditory recognition was measured by a sentence completion task according to the number of words correctly perceived, excluding articles, prepositions, and conjunctions, and as to whether the meaning of the sentence was correctly perceived. Reaction times were also recorded in an effort to determine the presence of blocking. Results showed tha one group of subjects ("repressers") displayed significantly slower reaction times and were less accurate in recognizing sentences containing sexual or aggressive themes than another group of subjects ("intellectualizers"). No differences in reaction times were found on the neutral sentences. Similarly positive results using

threatening auditory stimulation were obtained by Vanderplas and Blake (1949).

However, the early research was not uniformly consistent in showing individual differences in response to threat. One available study, reported by Kurland (1954), found no support for perceptual defense or, by implication, the repression-sensitization dimension. Subjects were 15 "repressers" and 22 "obsessive-compulsives" as determined by clinical psychiatric methods. A group of 21 non-patients served as normal controls. Groups were matched for age, sex, IQ, and educational level. Neutral (e.g., "robin," "table," "book") and emotional (e.g., "kill," "intercourse," "homosexual") words were recorded at increasing levels of loudness so that recognition thresholds could be obtained using an ascending method of limits. Subjects listened to the recorded words through headphones and repeated each word when recognition occurred. No between-groups differences in recognition thresholds to emotional words were found, leading the author to tentatively reject the notion of perceptual defense and individual response differences to threat. But no attempt was made to reconcile these findings with positive results obtained by other investigators. The author merely advocated "further study" without elaboration or concrete suggestion.

In general, then, the preponderant weight of the evidence has supported the notion of perceptual defense and individual differences in response to threatening stimuli as measured by differential recognition thresholds for both visual and auditory stimuli. However, response measures other than recognition thresholds were used in the early research to demonstrate the existence of the repression-sensitization

dimension. For example, Eriksen (1952) used number of verbal associations as the dependent variable. Two experiments were undertaken. In experiment I, subjects unscrambled 16 20-word sentences and later recalled the sentences. In experiment II, subjects were divided into two groups on the basis of whether they tended to recall more completed (Success Recall Group) or incompleted (Failure Recall Group) sentences. Subjects were then required to free-associate to a list of emotional words. It was found that the Success Recall Group made significantly fewer associations than the Failure Recall Group, thereby demonstrating repressive behavior. Conversely, the greater number of associations made by the Failure Recall Group suggested a sensitizing process.

In addition to success versus failure, electric shock was also employed in the early studies to demonstrate individual differences in response to threat. Eriksen and Kuethe (1953) had subjects free-associate to a list of neutral words. Shock was administered after five randomly chosen response words. On further association trials, subjects were shocked when they gave any of the five response words. They were then asked to chain-associate to a list of words. Results showed that one group of subjects ("insight subjects") gave significantly fewer shocked response words, which the authors broadly interpreted as defensive behavior. But this result might also be interpreted more specifically in the context of repression-sensitization theory as repression of responses rather than the conscious suppression of shocked responses as implied by the "insight" label.

The utility of the simultaneous use of success versus failure and electric shock as independent variables in the study of the repression-

sensitization dimension was demonstrated by Lazarus and Longo (1953). Subjects were required to learn serial word lists and were shocked at selected points throughout each list. During subsequent free recall, it was found that subjects who tended to recall their failures tended to recall material associated with shock, while those who forgot one forgot the other. However, no attempt was made to categorize subjects as repressors or sensitizers prior to experimental manipulations. Therefore any possible differential susceptibility of repressors and sensitizers to shock and failure could not be determined. But the value of the study lies in its demonstration that repressing and sensitizing behavior can be elicited in response to failure and electric shock.

Responses to projective instruments also demonstrated the viability of the repression-sensitization dimension when response measures other than recognition threshold were used. Eriksen and Lazarus (1952), for example, measured association latencies to aggressive and succorant words and then scored subjects' Rorschach responses for themes of aggression and succorance. It was found that subjects having relatively shorter latency for word association tended to express Rorschach themes more readily than did subjects having relatively longer association latency. Similarly, Ullman (1958) found that giving emotional words in response to TAT cards was positively related to the number of Rorschach responses given. As in the recognition threshold studies involving projective techniques, these results may be taken as evidence in favor of both the existence of the repression-sensitization response dimension and the "unconscious" nature of such responding.

A final type of response other than recognition threshold which

was used in the early research to study individual differences in response to threat was the humor response. Ullman and Lim (1962) researched the case histories of 33 male psychiatric patients and classified them as "facilitators" or "inhibitors." Subjects were required to rate 64 cartoons along a scale of most to least funny. Cartoons contained themes of sexuality, hostility, ridicule, or nonsense. Results showed that facilitators rated cartoons with sexual or hostile content as significantly more amusing than inhibitors, which suggested the presence of both repressing and sensitizing processes in response to emotionally-laden stimuli.

In summary, the early research investigating the phenomenon of perceptual defense, with one exception, consistently demonstrated individual differences in response to threat. One group of subjects appeared to "repress" responding, while another group displayed increased "sensitivity" to threatening stimuli. These behavior tendencies were demonstrated in a wide variety of experimental situations, including those involving perceptual responses, verbal association and memory, responses to failure and electric shock, responses to projective tests, and even humor responses. Both differential recognition threshold and other variables were used as response measures. Such differential responding to threat therefore appeared to be relatively pervasive and eminently worthy of further investigation. However, the widely diverse ways in which the repression-sensitization dimension had been measured effectively precluded the use of any one variable as a reliable measure without further synthesis and research. Moreover, as Byrne and Holcomb (1962) pointed out, the problem of low or even unknown reliability for

many of the measures was an additional difficulty. It was these considerations which initiated the body of research which ultimately culminated in the construction of the Repression-Sensitization Scale.

B. Construction of the Repression-Sensitization Scale

The bulk of the research aimed at developing a reliable measure of the repression-sensitization dimension was based upon subscales of the Minnesota Multiphasic Personality Inventory (MMPI). This was in large measure due to the fact that the individual subscales and subscale combinations reflect different defensive modes (Eriksen & Browne, 1956). MMPI subscales reflecting repression-sensitization were found to be related to such variables as response to failure (Page & Markowitz, 1955), frequency of dream recall (Tart, 1962), incidental memory for word associations (Carlson, 1954), predictive behavior (Gordon, 1957, 1959), differential recall of completed and incompleted tasks (Eriksen, 1954), and defense mechanisms in hospitalized neurotics (Ullman, 1958). A wide range of subscales was used as measures of repression-sensitization, including K (e.g., Page & Markowitz, 1955), L (e.g., Tart, 1962), F minus K (e.g., Ullman, 1958), Hy (e.g., Mathews & Wertheimer, 1958), Hy denial (e.g., Carlson, 1954), Hy admission (e.g., Gordon, 1959), Hy minus Pt (e.g., Truax, 1957), Pt (e.g., Eriksen & Davids, 1955), MAS (e.g., Gordon, 1959), and Welsh A and R (e.g., Tart, 1962).

With this research as a basis, two separate and independent efforts were undertaken to construct a single, comprehensive MMPI scale to measure the repression-sensitization dimension. One of these efforts was reported by Ullman (1958, 1962), who attempted to extend Shannon's (1955, 1962) work with facilitators and inhibitors. Both authors

considered facilitation-inhibition to be synonymous with repression-sensitization. Ullman (1958) devised a system for scoring case history material in the categories of facilitation or inhibition. However, this system was effectively limited due to difficulties with interjudge reliability, the use of discrete categories of individuals rather than a continuum, and its inapplicability to nonpatient populations. Thus Ullman (1962), in an effort to overcome these problems, devised an empirically-derived MMPI scale to measure the facilitation-inhibition dimension. Thirty-eight facilitators and 24 inhibitors were selected by the case history method and their responses on each of the 566 MMPI items were item-analyzed and cross-validated with a sample of 48 facilitators and 22 inhibitors. In both samples, a total of 24 items met the criterion of differentiation at the .05 level of confidence. Twenty-three additional items which differentiated at the .10 level were included in the final 44-item scale. The corrected split-half reliability was found to be .96, with test-retest reliabilities of .88 (one to 18 months), .71 (19 to 36 months), and .54 (37 to 85 months).

At approximately the same time, and independently of Ullman's (1958, 1962) work, Altrocchi, Parsons, and Dickoff (1960) were also undertaking to construct an MMPI scale to measure repression-sensitization. Drawing upon the available literature reporting MMPI subscale correlates of repression-sensitization, these authors selected three subscales as likely measures of sensitization (D, Pt, and Welsh Anxiety), and three others as measures of repression (L, K, and Hy denial). An index of repression-sensitization was obtained by subtracting total score on the latter three scales from total score on the former three scales.

However, Altrocchi's repression-sensitization index contained a number of internal inconsistencies, principally with regard to item overlap. The differential weights for several of the items, both within and between the repression and sensitization subscales, were considered by Byrne (1961) to be potential measurement difficulties. To circumvent such difficulties, Byrne substituted a scoring system whereby each item on the six scales was scored only once and all inconsistently scored items were eliminated. This procedure resulted in a 156-item Repression-Sensitization (R-S) scale on which high scores indicated sensitizing responses and low scores indicated repressing responses. Subsequently, an internal-consistency item analysis was undertaken with two independent subsamples of 370 students each (Byrne, Barry, & Nelson, 1963). Those items which showed correlations with the total R-S score beyond the .001 level of confidence in both samples were retained as scorable items. The result was a revised R-S scale of 182 items which contained approximately 70% of Altrocchi's original items. The revised scale was found to have a corrected split-half reliability of .94 and a three-month test-retest reliability of .82. In addition, it was found to correlate .76 and .88 with the Facilitation-Inhibition (F-I) scale in two different student populations (Bernhardson, 1967; Byrne, 1964). The original R-S scale was found to correlate .94 with the F-I scale in a neuropsychiatric patient population (Ullman, 1962). Moreover, about 50% of the items in the F-I scale are also contained in both the original and revised R-S scales. These findings have led most authors, including the scales' constructors, to regard the R-S and F-I scales as "interchangeable measuring devices (Byrne, 1964, p. 177)."

However, the bulk of the research on the repression-sensitization dimension has been conducted with the R-S scale.

C. Research on the Repression-Sensitization Scale

Immediately upon introduction of the R-S scale, studies relevant to its construct validity were undertaken with a wide variety of psychological variables. That the R-S scale has generated a substantial amount of research interest is attested by the fact that well over 200 such studies have been published since the introduction of the scale. The area receiving the most attention has been differential reaction to threat, which is not surprising in view of the scale's theoretical rationale. These investigations have been similar in design to the earlier studies of perceptual defense. Typically, subjects are divided according to high and low scores on the R-S scale, presented with threatening and nonthreatening stimuli, and their reactions to such stimuli are assessed. As in the earlier, pre-scale studies, results have generally supported the assumptions of the R-S scale, with repressors and sensitizers responding differentially and predictably to anxiety-evoking stimulation. For example, Haney (1974) found that repressors gave fewer associations to words having sexual connotations, while Galbraith and Lieberman (1972) found that sensitizers were more responsive to sexual stimulation as measured by reaction time and number of associations to "double entendre" words. Similar results have been obtained with a wide variety of threatening stimuli, including sexual sentences (Schill & Althoff, 1968), death-related words (Templer, 1971), subliminal threatening words (Wagstaff, 1974), nonsense syllables previously paired with "taboo" words (Hutt & Anderson, 1967), emotionally

loaded color slides (Buck, Miller, & Caul, 1974; Carroll, 1972), stressful film (Davidson & Watkins, 1971; Haley, 1974; Woods, 1972), "gory" literary passages (Neufeld, 1975), and ego threat (Barton & Buckout, 1969; Dublin, 1968; Lefcourt, 1969; Markowitz, 1969; Zemore & Greenough, 1973). Although some few studies (e.g., Farley & Mealiea, 1973; Good & Levin, 1970) have not demonstrated differential responsiveness of repressors and sensitizers to threat, these findings are relatively sparse and insignificant in comparison with the substantial positive evidence. In other areas, ranging from studies of interpersonal cognitive complexity (Wilkins, Epting, & van de Riet, 1972) to expectations for psychotherapy (Baldwin, 1974), the construct validity of the R-S scale has also been consistently demonstrated. Only one variable, frequency of dream recall, has consistently failed to show the typical repressor-sensitizer differences (Anish, 1970; Bone, Nelson, & McAllister, 1970; Cory, Ormiston, Simmel, & Dainoff, 1975; Grieser, Greenberg, & Harrison, 1972; Robbins & Tanck, 1970; Williamson, Heckel, & Boblitt, 1970). However, the hypothesis that repressors should remember relatively fewer dreams, particularly stressful dreams, is questionable, since possible variables influencing dream recall have not yet been delineated to any significant extent.

Thus the great majority of studies employing the R-S scale have affirmed the construct validity of the scale. The most theoretically relevant finding has been the relatively consistent demonstrations of the ability of the R-S scale to reliably differentiate response to threatening stimuli. In one respect, however, the usefulness of the R-S scale has been challenged by the demonstration that the scale does

not possess high discriminant validity. A number of studies (Abbott, 1972; Golin, Herron, Lakota, & Reineck, 1967; Joy, 1963; Kilpatrick, Cauthen, & Roitzsch, 1971; Millimet & Cohen, 1973a,b; Newton, 1968; Rios-Garcia & Cook, 1975; Tempone & Lamb, 1967) have reported highly significantly correlations (.84 to .91) between the R-S scale and measures of trait anxiety such as the Taylor Manifest Anxiety (MA) scale (Taylor, 1953) and the A-Trait scale of the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970). This relationship has been found to hold even when items common to both scales have been eliminated (Sullivan & Roberts, 1969). Such results have led these investigators to assume that the R-S and trait anxiety scales measure the same personality dimension, with the authors of one report (Golin et al., 1967) stating unequivocally that the scales "are practically identical in psychological meaning (p. 569)." Thus, according to this view, repressors would be low-anxious individuals, while sensitizers would be high-anxious individuals, per se. In response to threatening stimulation, repressors would be expected to avoid both the verbalization and the subjective experience of anxiety, while sensitizers might be expected to both experience anxiety keenly and readily report the experience (cf. Byrne, 1964).

Scarpetti (1973) has taken exception to this interpretation of the R-S scale. Based upon a review of the relevant literature, he hypothesized that when measures other than self-report are used, repressors may show more disruption under noxious stimulation than sensitizers. Furthermore, this relationship holds most clearly in situations involving anticipation of stress, rather than during the stressful event

itself. Scarpetti tested this hypothesis by subjecting repressors and sensitizers to electric shock and recording galvanic skin response (GSR). GSR was also recorded during a 5-min anticipatory period after shock subjects had been attached to the electrodes and informed that they would be shocked but before the shock was actually administered. Non-shock subjects were attached to a hand vibrator massager to simulate the tactile sensation of shock but without the pain involved in shock. All subjects were administered the A-State scale of the STAI at the beginning of the anticipatory period (but prior to attachment of the electrodes) and following experimental manipulations. Whether the amount of state anxiety present at the beginning of the anticipatory period is representative of degree of anticipatory anxiety is debatable, since it would seem logically consistent with Scarpetti's hypothesis to assume that an increment in anxiety would occur at some time during anticipation. Such an assumption is particularly relevant to Scarpetti's arguments given his citation of Bresnitz's (1967) anticipatory heart rate data, discussed below.

In spite of, or perhaps because of, these apparent methodological shortcomings, Scarpetti's results were generally in the predicted direction. Repressors were found to be physiologically more reactive than sensitizers during anticipation of shock. However, they also showed more reactivity under experience of shock. No significant differences were found in the no-shock condition. (But inspection of $\underline{F}$ values obtained reveals that most GSR indices produced no significant between-groups differences. Indeed, it appears likely that the conclusion that repressors showed more physiological reactivity under shock conditions

may have referred to a confidence level of .25 in many cases.) A-State data showed that repressors reported significantly less anxiety than did sensitizers both immediately before and immediately after experiencing shock. No differences between groups were found in the no-shock condition. However, rank-order correlations for the physiological and A-State data did not reach significance, leading the author to conclude that "while as a group, sensitizers reported more anxiety to impending painful stimulation while manifesting less physiological disturbance than repressors, this relationship does not appear to be of sufficient magnitude to allow accurate prediction of individual performances on either measure from knowledge of performance on the other (p. 380)." Nonetheless, the author regarded these results as "lend(ing) general support (p. 380)" to the hypothesis that repressors react with greater electrodermal activity in the anticipation of electric shock than do sensitizers but report less anxiety.

Scarpetti speculated that one possible explanation for the failure of many of the GSR indices to discriminate repressors from sensitizers was that the anticipatory period was too short. In support of this speculation, he cited a study by Bresnitz (1967), in which heart rate to threat of shock increased significantly the longer the anticipation interval (measurements were obtained for 3-, 6-, and 12-min intervals), which is consistent with the "incubation of threat" hypothesis. Thus Scarpetti advocated the use of a longer anticipatory period in measuring physiological response to threat.

In conclusion, Scarpetti hypothesized that his data may indicate that repressors are not simply low-anxious individuals in terms of not

experiencing anxiety in response to stress, but rather are "very sensitive (p. 381)" to noxious stimulation. However, they react to threat by denial and cognitive avoidance, and thus refrain from reporting feelings of anxiety. Sensitizers, on the other hand, freely report and possibly exaggerate their anxiety, which Scarpetti's physiological data would (marginally) indicate is less than that experienced by repressors.

Given Scarpetti's methodological shortcomings, and the somewhat equivocal nature of his data, the present study was designed to further study these hypotheses by means of a procedure which should more clearly delineate the self-report, behavioral, and physiological aspects of the repression-sensitization dimension as a function of stress. Moreover, since the present design is similar to that of a previous study of trait anxiety (Glover & Cravens, 1974), results should further clarify the relationships, if any, between repression-sensitization and trait anxiety in an experimental situation involving quantifiable measures of behavior. (It will be recalled that previous studies comparing these personality dimensions were purely correlational in nature.) In addition, the anticipatory period was lengthened to 10 min and heart rate was added as a dependent physiological measure. Also, subjects were asked to complete the A-State scale immediately following the anticipatory period, with electrodes having been attached at the beginning of the period. As noted above, Scarpetti obtained A-State data at the outset of the anticipatory period and prior to attachment of the electrodes. Finally, an attempt was made in the present study to quantitatively equate the subjective distress produced by electric shock between groups by equating strength of grip in response to various

levels of shock. This procedure was considered to be a methodological improvement over the conventional practice of having subjects choose a level of shock which they consider to be "unpleasant" or "moderately painful" or "as much as you are willing to tolerate." Studies using subject self-report as the basis for intensity of shock have been equivocal in between-groups differences obtained for the trait anxiety and repression-sensitization dimensions. For example, Glover and Cravens (1974) found no differences between high and low trait anxious subjects in level of shock tolerated. Merbaum and Badia (1967) found that sensitizers tolerated significantly less shock than repressors, while Scarpetti (1973) found no differences between repressors and sensitizers in level of shock tolerated.

Specifically, the present study should supply data relevant to the following questions:

(1) Is the effect of threatening stimulation which Scarpetti (1973) observed for electric shock also demonstrable for other forms of noxious stimulation (e.g., failure stress)?

(2) Can differential disruption also be shown in a verbal learning task (which may be regarded as a more specifically behavioral measure than either physiological reactivity or self-report)?

(3) If so, is this effect differential for the level of difficulty of the learning task (which drive theory postulates for the highly correlated dimension of trait anxiety)?

The following hypotheses, based upon the conclusions drawn by Scarpetti (1973), may be advanced for the present study:

(1) Repressors will show greater disruption of behavior in response

to electric shock as measured by GSR and heart rate but will report less state anxiety than sensitizers. Greater disruption should be shown in the anticipation period prior to shock relative to the verbal learning period when shock is actually experienced.

(2) Non-stress subjects will not differ in anticipatory GSR and heart rate or in GSR, heart rate, and verbal learning performance in the verbal learning period.

The available data relevant to possible effects of failure stress are equivocal, with researchers reporting mixed results involving recall of successes versus failures (Mischel & Ebbesen, 1973; Tudor & Holmes, 1973), recall of completed versus incompleted tasks (Farley & Mealiea, 1973), and ego threat (Barton & Buckout, 1969; Dublin, 1968; Lefcourt, 1969; Markowitz, 1969; Zemore & Greenough, 1973). There are no available studies which have directly assessed the effects of failure stress on repressors and sensitizers. However, Glover and Cravens (1974) found that subjects low in trait anxiety were more susceptible to electric shock and subjects high in trait anxiety were more susceptible to failure stress as measured by verbal learning performance. Since the R-S and trait anxiety dimensions are highly correlated, it is logical to postulate a similar differential effect for repressors and sensitizers. Thus the failure stress variable was included in the present investigation in an attempt to explore the behavioral ramifications of the significant correlation between the R-S scale and measures of trait anxiety.

## METHOD

Subjects.--Subjects (Ss) were 72 male students from introductory psychology classes at Virginia Polytechnic Institute and State University. Ss were chosen from the upper and lower 25% of the distribution of scores obtained on the revised form of the Repression-Sensitization scale (Byrne, Barry, & Nelson, 1963). The entire sample had a mean of 44.48 and a standard deviation of 16.39. Ss scoring in the upper 25% were termed "sensitizers," while those scoring in the lower 25% were termed "repressors." These percentage values corresponded to cut-off levels of 59 and 26, respectively. Ss were informed during the testing session that if selected for further participation they would be subjected to harmless electric shock or would be required to demonstrate their verbal learning abilities in an experimental situation. If either of these alternatives was objectionable to them, they were permitted to refuse to participate further.

Apparatus.--Apparatus consisted of a Lafayette model A615A Master Shocker controlled by a Lafayette model 5040A electric timer, a Lafayette model 76619 hand dynamometer for recording strength of grip, a Data Graph Systems model 76101 polygraph for recording galvanic skin response (GSR) and heart rate, and a Lafayette model 2303 B3 memory drum for presentation of the word lists.

Procedure.--Twelve repressors (R) and 12 sensitizers (S) were randomly assigned to each of three test conditions: pain stress (P), failure stress (F), or neutral condition (N). The experimenter (E) was blind with regard to subject personality type. In order to experimentally manipulate level of difficulty of the verbal learning material, Ss were required to learn two lists of 14 pairs of adjectives each, as

shown in Table 1. The first or Initial List was learned under standard

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Insert Table 1 about here

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paired-associate instructions only, while the second or Transfer List was learned under conditions of experimental pain, failure instructions, or neutral instructions.

The Initial List, which consisted of 14 of the 15 pairs used by Lee (1961), consisted of closely associated adjectives with minimal intralist similarity. One presentation and four learning trials were presented at a 2.2-sec rate with a 12-sec intertrial interval (ITI). During the ITI, Ss were instructed to audibly count backward by threes from a randomly selected number to prevent rehearsal. Word pairs were presented in a different order on each trial with the restriction that at least two intervening pairs appeared between consecutive pairs of an immediately preceding trial. Data from Ss who did not give a minimum of seven correct anticipations in one of the four initial learning trials were not analyzed. Three subjects were eliminated on this basis. The number of errors (omissions plus intrusions) on the initial learning trials (2-5) were recorded.

The Transfer List was constructed for the purpose of operationally defining level of difficulty. Easy pairs were those taken intact from the Initial List (Unchanged Pairs), while difficult pairs were made by associating stimuli from the Initial List with a new response from the Initial List (Changed Pairs). Two transfer lists, each consisting of seven Changed and seven Unchanged Pairs, were constructed and counterbalanced within treatment groups. Ss were given one presentation trial and six learning trials under experimental conditions. All learning

conditions were identical with those of the initial trials with the restriction that no two pairs in the same category (Changed or Unchanged) appeared more than twice in succession. Ss were informed of the nature of the Transfer List prior to presentation. The number of errors (omissions plus intrusions) on transfer learning trials (2-7) were recorded.

Following the learning of the Initial List, pain-stress Ss were informed that they would receive harmless electric shock during the learning of the Transfer List but that shock would be random and unrelated to performance. They were then given the opportunity to refuse to participate further in the experiment. If they elected to continue, they were requested to sign a form stating their willingness to receive harmless electric shock and indicating the absence of any physical or mental disability which might be adversely affected by shock. Ss were then attached to the polygraph for recording GSR and heart rate, followed by attachment of the shock electrodes to the tips of each of the first two fingers of the nonpreferred hand. Ss were then requested to sit quietly for precisely 10 min, during which time GSR and heart rate were continuously recorded. At the end of this period, they were requested to complete the A-State scale of the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970). Shock level was then determined in the following manner. A full-strength squeeze was obtained from each S and recorded in kilograms (kg). Shock was then administered for 1.0-sec duration in .1 milliamp (ma) increments beginning at .2 ma and Ss were requested to squeeze the hand dynamometer with a force analogous to each level of shock. The maximum level of

shock Ss could receive was 1.0 ma. Shock intensity for experimental purposes was that level of shock at which S squeezed the hand dynamometer with a force equal to the closest approximation of 70% of the full-strength squeeze. In order to obtain an accurate reading of shock level, Ss were administered the 70% shock level for 3.0 sec. Shock was then administered for 1.0-sec duration prior to the presentation of the Transfer List and midway through the ITI after transfer trials 1, 3, 4, and 5. Shock was not administered during trials in order to avoid association with any particular pair in the list. GSR and heart rate were recorded continuously throughout transfer learning.

Failure-stress Ss were attached to the polygraph and given a combination of failure and ego-involving instructions using guidelines suggested by Long and Bessemer (1971). These instructions, which were given prior to learning the Transfer List, were as follows:

You didn't do very well on this list at all. Most of the other students in the experiment have done considerably better, so let's try another list. This list also contains word pairs. Some of the pairs are the same as those on the first list, while the remaining words have been re-paired. This list is essentially a test of verbal learning ability and IQ. That is to say, the better you perform on this list, the better your verbal learning ability and the higher your IQ score. The score that you make on this list will be compared with the scores of the other students in the experiment. You should concentrate and try to learn the associations as quickly as possible. Try to do a little better than you did on the first list. Do you have any questions before we begin?

Following failure instructions, Ss were required to sit quietly for precisely 10 min, during which time GSR and heart rate were continuously recorded. At the end of this period, they were requested to complete the A-State scale.

The following brief instructions were given between transfer trials 4 and 5:

So far you haven't done too well on this list. Your performance is still well below average. But you still have a few more trials to go, so concentrate a little harder and try to cut down on the number of errors. Remember, the object is to make as few mistakes as possible.

Ss in the neutral group were instructed only in the performance of the task and received neither shock nor failure instructions. Otherwise, experimental conditions were identical with those for pain-stress and failure-stress Ss.

Immediately following the transfer trials, each S was given the A-State scale and instructed to record how he felt during transfer learning. Failure-stress Ss were then informed of the purposes of the experiment and the arbitrary nature of the failure communication. They were asked not to discuss the experiment with Ss who had not yet participated. In order to obtain a normal baseline for A-State, all Ss were given the A-State scale following debriefing.

## RESULTS

A. Learning Data

The total number of errors on the Initial List were analyzed as six independent groups and by a 2 x 3 analysis of variance. No significant differences were found in either case. Thus any differences observed in transfer learning could be attributed to the effects of experimental stress. Means and standard deviations for the total number of errors on the Initial List are shown in Table 2.

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Insert Table 2 about here

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The total number of errors on the Changed and Unchanged Pairs of the transfer lists were analyzed by means of 2 x 3 analyses of variance. No significant differences were found for the Changed Pairs, as shown in Table 3. That the Changed Pairs were difficult to learn was shown

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Insert Table 3 about here

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by the fact that subjects gave only 1.48 correct responses per trial. Analysis of the Unchanged Pairs revealed a significant main effect for Stress ($F = 3.18$, $df = 2/66$, $p < .05$) and a significant Personality x Stress interaction ($F = 5.008$, $df = 2/66$, $p < .01$). The complete analysis is shown in Table 4. Further analysis of the significant Per-

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Insert Table 4 about here

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sonality x Stress interaction by means of Duncan's new multiple range test (Klugh, 1970) revealed that the SF group made significantly more errors than the SP group ($R_5 = 5.44$, $p < .01$), the RN group ($R_5 = 5.44$,

$p < .01$), the RF group ($R_4 = 4.07$, $p < .05$), and the SN group ($R_3 = 3.94$, $p < .05$). A strong trend of more errors by the RP group than the RN and SP groups was also observed (range = 3.66, $R_4 = 4.07$ at .05). The SF and RP groups were not significantly different in total number of errors. Means and standard deviations for the total number of errors on the Changed and Unchanged Pairs are presented in Table 5.

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Insert Table 5 about here

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B. A-State Data

Scores on the A-State scale obtained for the anticipatory, learning, and post-learning periods were analyzed by means of separate 2 x 3 analyses of variance. In addition, the performance of each group was analyzed across the three experimental periods in a three-way analysis of variance. This was done in order to compare the relative amounts of anxiety reported by each group at each of the experimental periods.

The 2 x 3 analysis of variance for the anticipatory period revealed a significant main effect for Personality ($F = 28.269$, $df = 1/66$, $p < .001$), with sensitizers reporting significantly more state anxiety than repressors. For the learning period, significant main effects for Personality ($F = 12.448$, $df = 1/66$, $p < .001$) and Stress ($F = 4.180$, $df = 2/66$, $p < .025$) were found. Again, sensitizers reported significantly more state anxiety than repressors. However, Duncan's new multiple range test found no significant differences among stress groups. But more importantly, a significant Personality x Stress interaction was found for the learning period ($F = 4.281$,

df = 2/66, $p < .025$). Subsequent analysis with Duncan's new multiple range test showed that the SF group reported significantly more state anxiety than any other group (for RN, $R_5 = 10.16$, $p < .01$; for RF, $R_5 = 10.16$, $p < .01$; for SP, $R_4 = 9.97$, $p < .01$; for RP, $R_3 = 9.70$, $p < .01$; for SN, $R_2 = 9.31$, $p < .01$). No other groups were significantly different. Analysis of the post-learning period showed a significant main effect for Personality ($F = 14.273$, df = 1/66, $p < .001$), with sensitizers reporting significantly more state anxiety than repressors. Analyses of variance for each of the three experimental periods are shown in Tables 6-8. Means and standard deviations of A-State scores

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Insert Tables 6-8 about here

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for experimental periods are presented in Table 9.

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Insert Table 9 about here

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Separate analyses of variance of the A-State data for each group across the experimental periods revealed that, in every case, subjects reported significantly more state anxiety during the learning period than in any other period. These analyses are shown in Table 10. In the

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Insert Table 10 about here

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case of the SP group, this difference was significant at only the .10 level. In addition, the amount of state anxiety reported by all groups during the anticipatory period was not significantly different from the amount of state anxiety reported at the post-learning, or baseline normal, period. For the SP group, this difference was not as pronounced

as in the other groups, due to the lesser degree of overall significance attained by the SP group.

C. Physiological Data

Heart rate data were analyzed by means of a 2 x 3 analysis of variance for the first five minutes of the anticipatory period, the second five minutes of the anticipatory period, the total anticipatory period, and the learning period. In addition, a four-way analysis of variance was conducted for each group across the four experimental periods. This was done in order to assess the relative heart rate of each group during each period.

The 2 x 3 analyses of variance of heart rate revealed a significant main effect for Personality at each experimental period, as shown in Tables 11-14. In each case, sensitizers showed a significantly higher

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Insert Tables 11-14 about here

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heart rate than repressors. Means and standard deviations of heart rate at each experimental period are presented in Table 15. The individual

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Insert Table 15 about here

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four-way analyses of variance across periods revealed no significant differences for any group.

The galvanic skin response (GSR) data were analyzed as level of skin conductance manifested in peak skin resistance, mean skin resistance, and range of skin resistance. In each case, 2 x 3 analyses of variance were conducted for each of the four experimental periods in addition to a four-way analysis for each group across the periods. No

significant differences were found for the 2 x 3 analyses with the exception of a significant Personality x Stress interaction for peak skin resistance for the total anticipatory period ($\underline{F} = 4.031$, $\underline{df} = 2/66$, $\underline{p} < .05$). Subsequent analysis with Duncan's new multiple range test showed that the RP group manifested a significantly greater peak skin resistance than the SN and RF groups ($R_5 = 25225.8$, $\underline{p} < .05$). The difference between the RP and RN groups approached significance (range = 24224.9, $R_4 = 24663.5$ at .05). A similar trend of greater peak skin resistance for the SF group than the SN group was also found (range = 23233.3, $R_5 = 25225.8$ at .05). The complete analysis of variance of peak skin resistance in the total anticipatory period is shown in Table 16. Group means are presented in Table 17.

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Insert Tables 16 and 17 about here

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Analyses of variance for each group across the four experimental periods showed no differences among periods for any group with regard to peak skin resistance or mean skin resistance. For range of skin resistance, significant differences were found for the SN ($\underline{F} = 4.281$, $\underline{df} = 3/44$, $\underline{p} < .05$) and RP ($\underline{F} = 3.595$, $\underline{df} = 3/44$, $\underline{p} < .05$) groups, as shown in Table 18. Further analysis with Duncan's new multiple range

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Insert Table 18 about here

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test revealed that, for both groups, greater range of skin resistance was shown in the total anticipatory period relative to the learning period (for SN, $R_3 = 8536.30$, $\underline{p} < .05$; for RP, $R_3 = 22945.83$, $\underline{p} < .01$). Although no significant differences were observed among experimental

periods for any other group, all other groups with the exception of RN showed a similar trend in mean scores, as shown in Table 19.

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Insert Table 19 about here

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D. Shock Level Data

Shock level data were analyzed by means of a *t*-test. No significant between-groups differences were found ($t = 0.988$, $df = 22$). Means and standard deviations of shock level are presented in Table 20.

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Insert Table 20 about here

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## DISCUSSION

No support was found for Scarpetti's (1973) hypothesis that repressors should show greater electrodermal activity in the anticipation of electric shock than during the experience of shock. Indeed, the SF and RP groups showed less arousal in the anticipation of stress as measured by peak skin resistance even though they made more errors during learning than other experimental groups. One possible explanation for this seemingly paradoxical finding is that repressors and sensitizers can successfully defend against the threat of electric shock and failure, respectively, but that once they are subjected to these stressors, defenses break down and behavior is disrupted. Although such disruption was not manifested in a lower level of skin resistance for the SF and RP groups during learning, the fact that these groups no longer displayed the significantly higher levels of resistance associated with relative relaxation would suggest a comparatively greater level of arousal and thus an electrodermal analogue of learning performance. This apparent breakdown in defensive strategy was partially reflected in A-State scores, with the SF group reporting significantly more state anxiety than any other group during learning and with no differences among groups at any other experimental period. The additional finding that all groups reported significantly more state anxiety during the learning period than during any other period, with level of state anxiety reported during the anticipatory period not significantly different from baseline normal, also suggests that the anticipatory period was relatively non-stressful under all experimental conditions. Moreover, Scarpetti's speculation that a longer anticipatory period would

result in relatively greater physiological reactivity during this period was not borne out by the data. In no case did heart rate or skin resistance indicate greater arousal during anticipation than during learning. Also, the fact that no greater reactivity was shown during the second half of the anticipatory period than during the first half indicated the absence of any trend toward greater arousal with temporal increases in anticipation. In general, the data showed that it is the actual experience of stressful stimuli, and not merely the threat or anticipation of such stimuli, which repressors and sensitizers find differentially disruptive.

On the other hand, it might be argued that the greater variability or lability of the RP group during the anticipatory period, as manifested in greater range of skin resistance, indicated the presence of greater anticipatory arousal in this group. However, the SN group, which received no stressful stimulation, also showed this difference, and most other groups showed a similar trend in mean scores. In addition, the SF and RP groups displayed less anticipatory arousal as measured by peak skin resistance. Furthermore, while some authors (e.g., Katkin, 1975; cf. Lacey, 1956) have attempted to equate electrodermal lability with arousal in response to stress, no consistent evidence of any such relationship has been found. More specifically, the bulk of the evidence indicates that, while individual differences in electrodermal lability have been consistently demonstrated, they are not related to the trait anxiety dimension as a function of threat of electric shock (Katkin, 1965, 1975). They are, however, monotonically related to degree of reticular activity (e.g., Burch & Greiner, 1960), which

reflects central nervous system activation. This would suggest that electrodermal lability may be a more direct index of attentional capacity than a general arousal response to stress. Thus the trend in the present data toward relatively less variability in the learning period for most subjects may have indicated a simple, undifferentiated attending response to the word pairs rather than, conversely, greater arousal in the anticipation of stress. One possible way to test this hypothesis would be to present subjects with attention-eliciting but non-stressful stimuli and measure electrodermal lability. The neutral condition of the present study could not be considered to be absolutely non-stressful since neutral groups also reported relatively greater state anxiety during learning. However, evidence relevant to the question of attentional capacity was presented by Coles and Gale (1971) and Siddle (1972), who found a direct relationship between number of non-specific GSRs and auditory vigilance as measured by number of correct signal detections. But these results may have been due to differences in auditory perceptual sensitivity rather than attentional capacity (cf. Katkin, 1975). A visual stimulus such as that used in the present investigation would appear to be a relatively "purer" measure of vigilance, since neutral words should present few problems of "sensitivity" as compared with the tonal scale. It is imperative, however, that any stress associated with learning be eliminated. In order to do so, neutral words might be presented tachistoscopically, with dependent measures consisting of either recognition threshold or number of correct recognitions and electrodermal lability. Procedural instructions should also be designed to minimize stress, since many subjects react to

ostensibly neutral experimental situations with increases in arousal.

Other limitations in addition to the stressful nature of the procedure prevented the results of the present study from being directly applicable to the question of attention versus arousal. The nonspecific GSR, the most widely used index of lability, could not be determined, since it could not be separated from any possible GSRs produced in response to shock during learning. Additionally, the finding of less variability in skin resistance during learning was significant for only two of the six experimental groups, with only a trend in mean scores for three of the remaining four groups. But despite these limitations, present results are not inconsistent with the notion of electrodermal lability as a measure of attentional capacity rather than an index of arousal in response to stress.

In general, then, results provided no support for Scarpetti's (1973) interpretations of the Repression-Sensitization scale. On the other hand, the heart rate and A-State data, in combination, may be interpreted as offering general support for Byrne's (1964) assumption that sensitizers should show a greater degree of sensitization or arousal to threatening stimuli. The fact that sensitizers showed a higher heart rate and reported greater state anxiety during all experimental periods would suggest both that the experiment in general induced some degree of anxiety and that sensitizers reacted with greater arousal than repressors. Furthermore, the direct relationship between heart rate and level of state anxiety, together with the absence of any such relationship for level of skin resistance, suggested that heart rate is a more accurate physiological measure of degree of subjective arousal than skin

conductance, at least with regard to a gross distinction between repressors and sensitizers. But that neither measure could provide a finer physiological distinction between personality types was shown by the fact that while SF and RP subjects made relatively more errors during learning, thereby evincing a relatively greater degree of arousal, such arousal was not differentially manifested in higher heart rate or lower level of skin conductance. Thus while in a general sense heart rate may be regarded as a more accurate physiological index of degree of subjective distress experienced by sensitizers and repressors, it cannot reflect differential susceptibility to stressful stimuli as learning performance has consistently done.

The learning and A-State data would also indicate that, as the consistent positive correlations have suggested, the Repression-Sensitization scale and measures of trait anxiety such as the Taylor Manifest Anxiety (MA) scale are indeed "practically identical in psychological meaning (Golin et al., 1967, p. 569)," at least insofar as learning performance and self-report of anxiety are concerned. The learning and A-State results were a virtual replication of those obtained by Glover and Cravens (1974) for subjects scoring at the extremes of the MA scale. That is, the learning performance of both high-anxious subjects and sensitizers is disrupted by failure-stress but not by pain-stress, and this disruption is readily reported as state anxiety. Conversely, the learning performance of both low-anxious subjects and repressors is disrupted by pain-stress but not by failure-stress, but these subjects tend not to report significantly greater amounts of state anxiety than repressors performing under relatively non-stressful conditions.

Moreover, repressors and sensitizers do not differ in the amount of electric shock taken as measured by verbal assent or strength of grip. Apparently strength of grip is simply a voluntary physical analogue of verbalization, at least with regard to subjective distress in response to shock, and is therefore no more sensitive than the A-State scale to the response of repressors to shock.

In sum, the learning and A-State data suggest that the trait anxiety dimension can be more accurately regarded as a subset of the repression-sensitization dimension. In particular, the fact that repressors and low-anxious subjects are disrupted in learning performance but do not report this disruption as state anxiety indicates that such subjects, rather than being generally unaffected by stressful stimuli, do indeed experience arousal under conditions of physical pain, at least, but will not or cannot report it, or perhaps even admit it to themselves. This behavioral pattern meets all the requirements of the process of repression as classically conceived, with denial of the anxiety-inducing aspects of a given experience but with evidence of the stressful nature of the experience becoming manifest in a less direct manner. Therefore, low-trait-anxious individuals are not truly low-anxious, but rather are adept at concealing their anxiety from themselves and hence attempt to conceal it from others. It is only through certain overt behavioral measures such as learning performance that the anxiety becomes evident. Thus Byrne's (1964) assumption that repressors avoid the subjective experience of anxiety should be regarded as only superficially accurate, since the existence of a significant amount of anxiety at some level of experience is manifested behaviorally in

disruption of learning performance. That this anxiety exists on a consciously unreachable level, however, is attested by the consistent failure of these subjects to report relatively greater state anxiety or to show a preference for lower levels of electric shock. The precise etiology of this process, the underlying mechanism by which it operates, or whether it actually constitutes an "unconscious" process in the conventional sense, are all moot and probably not experimentally demonstrable. What is most important is that subjects scoring as low-anxious on measures of trait anxiety are not impervious to all classes of anxiety-inducing stimuli, but rather "repress" their responses to physically painful stimuli, at least, with the anxiety becoming manifest in disruption of behavior. This phenomenon is well-known to the clinician, who has frequent contact with overtly anxious patients who either deny their anxiety or cannot give a rational explanation for it. While present results cannot provide a novel clinical method of dealing with such "unconscious" anxiety, they are nonetheless valuable in providing an experimental demonstration of the existence of such anxiety.

TABLE 1

Initial and Transfer Lists

| Initial List | Transfer List 1 | Transfer List 2 |
|---|---|---|
| Absurd-Stupid | *Absurd-Stupid | *Brutal-Unkind |
| Pretty-Dainty | *Pretty-Dainty | *Unclear-Obscure |
| Faulty-Unsound | *Faulty-Unsound | *Speedy-Hurried |
| Liquid-Solvent | *Liquid-Solvent | *Fickle-Flighty |
| Barren-Sterile | *Barren-Sterile | *Rural-Rustic |
| Frigid-Chilling | *Frigid-Chilling | *Winding-Twisted |
| Double-Duplex | *Double-Duplex | *Afraid-Timid |
| Afraid-Timid | +Brutal-Obscure | +Absurd-Sterile |
| Brutal-Unkind | +Unclear-Rustic | +Pretty-Duplex |
| Unclear-Obscure | +Speedy-Unkind | +Faulty-Dainty |
| Speedy-Hurried | +Fickle-Hurried | +Liquid-Chilling |
| Fickle-Flighty | +Rural-Flighty | +Barren-Solvent |
| Rural-Rustic | +Winding-Timid | +Frigid-Unsound |
| Winding-Twisted | +Afraid-Twisted | +Double-Stupid |

* indicates Unchanged Pairs

+ indicates Changed Pairs

TABLE 2

Means and Standard Deviations of Total

Number of Errors on Initial List

| | SN | SF | SP | RN | RF | RP |
|---|---|---|---|---|---|---|
| Mean | 28.83 | 27.17 | 25.33 | 25.42 | 26.42 | 26.33 |
| S.D. | 3.56 | 7.45 | 5.99 | 5.20 | 8.89 | 5.09 |

TABLE 3

Analysis of Variance of Total Number of Errors on Changed Pairs

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 30.680 | 0.983 |
| Stress (S) | 2 | 8.000 | 0.256 |
| P x S | 2 | 10.056 | 0.322 |
| Error (w.g.) | 66 | 31.198 | |

TABLE 4

Analysis of Variance of Total Number of Errors on Unchanged Pairs

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 17.014 | 0.807 |
| Stress (S) | 2 | 67.042 | 3.180** |
| P x S | 2 | 105.600 | 5.008**** |
| Error (w.g.) | 66 | | |

**$p < .05$

****$p < .01$

TABLE 5

Means and Standard Deviations of Total Number of Errors on Changed and Unchanged Pairs

| | | SN | SF | SP | RN | RF | RP |
|---|---|---|---|---|---|---|---|
| Changed Pairs | Mean | 33.92 | 33.83 | 33.58 | 33.00 | 31.08 | 33.33 |
| | S.D. | 4.49 | 4.76 | 8.09 | 4.60 | 4.79 | 4.45 |
| Unchanged Pairs | Mean | 9.50 | 13.92 | 7.42 | 7.42 | 9.42 | 11.08 |
| | S.D. | 4.07 | 4.28 | 4.17 | 3.56 | 4.57 | 5.48 |

TABLE 6

Analysis of Variance of A-State Scores for the Anticipatory Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 1549.390 | 28.269****** |
| Stress (S) | 2 | 131.625 | 2.402 |
| P x S | 2 | 28.764 | 0.525 |
| Error (w.g.) | 66 | 54.808 | |

******$p < .001$

TABLE 7

Analysis of Variance of A-State Scores for the Learning Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 917.347 | 12.448****** |
| Stress (S) | 2 | 308.013 | 4.180*** |
| P x S | 2 | 315.514 | 4.281*** |
| Error (w.g.) | 66 | 73.696 | |

***$p < .025$

******$p < .001$

TABLE 8

Analysis of Variance of A-State Scores for the Post-Learning Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 684.500 | 14.273****** |
| Stress (S) | 2 | 75.514 | 1.575 |
| P x S | 2 | 16.625 | 0.347 |
| Error (w.g.) | 66 | 47.957 | |

******$p < .001$

TABLE 9

Means and Standard Deviations of A-State Scores for Experimental Periods

| | | SN | SF | SP | RN | RF | RP |
|---|---|---|---|---|---|---|---|
| Anticipatory Period | Mean | 40.08 | 43.92 | 46.66 | 32.50 | 35.42 | 34.92 |
| | S.D. | 4.12 | 8.17 | 9.98 | 9.00 | 5.99 | 7.27 |
| Learning Period | Mean | 50.42 | 60.08 | 48.25 | 42.00 | 46.42 | 48.92 |
| | S.D. | 9.89 | 7.95 | 6.22 | 9.46 | 7.93 | 7.26 |
| Post-Learning Period | Mean | 35.83 | 37.83 | 40.50 | 31.58 | 30.58 | 33.50 |
| | S.D. | 7.48 | 8.70 | 6.18 | 4.79 | 5.85 | 6.13 |

TABLE 10

Analyses of Variance of A-State Scores by Groups Across Experimental Periods

| | Source | df | MS | F |
|---|---|---|---|---|
| (a) SN | Periods | 2 | 67.503 | 10.890****** |
| | Error (w.g.) | 33 | 61.985 | |
| (b) SF | Periods | 2 | 15.869 | 21.257****** |
| | Error (w.g.) | 33 | 74.652 | |
| (c) SP | Periods | 2 | 201.194 | 3.144* |
| | Error (w.g.) | 33 | 64.000 | |
| (d) RN | Periods | 2 | 39.919 | 7.749***** |
| | Error (w.g.) | 33 | 51.513 | |
| (e) RF | Periods | 2 | 790.111 | 16.288****** |
| | Error (w.g.) | 33 | 48.508 | |
| (f) RP | Periods | 2 | 871.361 | 16.671****** |
| | Error (w.g.) | 33 | 52.268 | |

*$p < .10$

*****$p < .005$

******$p < .001$

TABLE 11

Analysis of Variance of Heart Rate for the First Five Minutes of the Anticipatory Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 16471.100 | 5.252** |
| Stress (S) | 2 | 66.264 | 0.021 |
| P x S | 2 | 7418.290 | 2.366 |
| Error (w.g.) | 66 | 3136.030 | |

**$p < .05$

TABLE 12

Analysis of Variance of Heart Rate for the Second Five Minutes of the Anticipatory Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 17640.700 | 5.878*** |
| Stress (S) | 2 | 285.722 | 0.095 |
| P x S | 2 | 6992.890 | 2.330 |
| Error (w.g.) | 66 | 3001.380 | |

***$p < .025$

TABLE 13

Analysis of Variance of Heart Rate for the Total Anticipatory Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 69440.200 | 5.707*** |
| Stress (S) | 2 | 502.125 | 0.041 |
| P x S | 2 | 28108.000 | 2.310 |
| Error (w.g.) | 66 | 12167.800 | |

***$p < .025$

TABLE 14

Analysis of Variance of Heart Rate for the Learning Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 26373.400 | 3.299* |
| Stress (S) | 2 | 4184.340 | 0.523 |
| P x S | 2 | 12266.500 | 1.534 |
| Error (w.g.) | 66 | 7995.230 | |

*$p < .10$

TABLE 15

Means and Standard Deviations of Heart

Rate for Experimental Periods

| | | SN | SF | SP | RN | RF | RP |
|---|---|---|---|---|---|---|---|
| AF5 | Mean | 76.35 | 78.47 | 82.62 | 76.38 | 74.03 | 68.87 |
| | S.D. | 10.59 | 11.80 | 15.36 | 10.88 | 8.33 | 9.86 |
| AS5 | Mean | 76.72 | 78.73 | 82.15 | 76.90 | 73.18 | 68.73 |
| | S.D. | 10.70 | 13.26 | 14.45 | 11.76 | 7.88 | 9.45 |
| TOT | Mean | 76.53 | 78.60 | 82.38 | 76.46 | 73.61 | 68.80 |
| | S.D. | 10.64 | 11.94 | 12.74 | 11.58 | 8.11 | 9.61 |
| LRN | Mean | 78.44 | 82.21 | 83.98 | 77.66 | 79.89 | 72.73 |
| | S.D. | 7.75 | 10.41 | 10.68 | 14.19 | 9.96 | 9.26 |

Legend: AF5 = first five minutes of the anticipatory period

AS5 = second five minutes of the anticipatory period

TOT = total anticipatory period

LRN = learning period

TABLE 16

Analysis of Variance of Peak Skin Resistance

in the Total Anticipatory Period

| Source | df | MS | F |
|---|---|---|---|
| Personality (P) | 1 | 61957000.000 | 0.080 |
| Stress (S) | 2 | 1538480000.000 | 1.986 |
| P x S | 2 | 3121890000.000 | 4.031** |
| Error (w.g.) | 66 | 774491000.000 | |

**$p < .05$

TABLE 17

Means of Peak Skin Resistance for the Total Anticipatory Period (Ohms)

| SN | SF | SP | RN | RF | RP |
|---|---|---|---|---|---|
| 45480.3 | 68641.6 | 53133.3 | 51291.7 | 45940.8 | 75516.6 |

TABLE 18

Analyses of Variance of Range of Skin Resistance

by Groups Across Experimental Periods

| | Source | df | MS | F |
|---|---|---|---|---|
| (a) SN | Periods | 3 | 415964000.000 | 4.281** |
| | Error (w.g.) | 44 | 97157900.000 | |
| (b) SF | Periods | 3 | 300911000.000 | 0.265 |
| | Error (w.g.) | 44 | 1137610000.000 | |
| (c) SP | Periods | 3 | 1198530000.000 | 1.660 |
| | Error (w.g.) | 44 | 722177000.000 | |
| (d) RN | Periods | 3 | 584211000.000 | 0.263 |
| | Error (w.g.) | 44 | 2218380000.000 | |
| (e) RF | Periods | 3 | 430865000.000 | 1.822 |
| | Error (w.g.) | 44 | 236455000.000 | |
| (f) RP | Periods | 3 | 1486340000.000 | 3.595** |
| | Error (w.g.) | 44 | 413441000.000 | |

**$p < .05$

TABLE 19

Means of Range of Skin Resistance for

Experimental Periods (Ohms)

| | SN | SF | SP | RN | RF | RP |
|---|---|---|---|---|---|---|
| AF5 | 17933.3 | 26983.3 | 22625.0 | 22500.0 | 16316.7 | 26933.3 |
| AS5 | 18875.0 | 25025.0 | 24375.0 | 29716.7 | 22341.7 | 24150.0 |
| TOT | 28041.7 | 31991.7 | 35833.3 | 38975.0 | 25925.0 | 38866.7 |
| LRN | 14166.7 | 19883.3 | 11416.7 | 33983.3 | 12541.7 | 11750.0 |

TABLE 20

Means and Standard Deviations of

Shock Level (Milliamps)

| | RP | SP |
|---|---|---|
| Mean | .668 | .590 |
| S.D. | .173 | .157 |

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# DIFFERENTIAL RESPONSIVENESS OF REPRESSORS AND SENSITIZERS TO STRESS

by

Carl B. Glover

(ABSTRACT)

Repressors and sensitizers were subjected to either electric shock or failure instructions in a verbal learning situation. Heart rate, skin conductance, and state anxiety data were obtained for a 10-min anticipatory period prior to learning as well as for the learning period itself. Results showed no support for Scarpetti's (1973) hypothesis that repressors should show more physiological reactivity than sensitizers but report less state anxiety in the anticipation of stress as opposed to the experience of stress. Rather, the data demonstrated that it is the actual experience of stressful stimuli, and not the threat or anticipation of such stimuli, which repressors and sensitizers find behaviorally disruptive. This disruption was grossly reflected in heart rate and state anxiety data, but not in skin conductance. Paradoxically, the sensitizer-failure (SF) and repressor-pain (RP) groups, which made relatively more errors during learning, showed less arousal in peak skin resistance in the anticipation of stress. This was interpreted in terms of a breakdown of defensive strategy under the actual experience of stress. Moreover, most groups showed a mean trend toward less variability in skin resistance during the learning period, which was considered to reflect an increase in attending behavior rather than arousal. Lastly, the finding of more errors by the SF and RP groups during learning and the failure of the RP group to

report this disruption as state anxiety, was similar to results obtained by Glover and Cravens (1974) for high and low trait-anxious subjects. This was regarded as behavioral support for the consistent high positive correlations found between measures of the two personality dimensions.