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The assessment of bodily injury fears via the behavioral avoidance slide test: A replication and extension

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The reported study involved a replication and extension of Peterson and Levis's (1985) experiment, which assessed bodily injury fears via the Behavioral Avoidance Slide Test (BAST). In the earlier study, a variable-exposure test procedure was used. The primary purpose of the present study was to provide a comparison between variable- and fixed-exposure test procedures. The fixed procedure has the advantage of controlling for test-stimulus exposure time. The study was also designed to assess the usefulness of an additional behavioral measure, that of response force, and to provide an additional assessment of the validity of selecting subjects' fear levels on the basis of scores on paper-pencil inventories. Both test procedures were found to produce comparable results, but the fixed-exposure procedure is preferred on methodological grounds. The force response showed promise as an additional behavior index but requires further assessment. The utility of the BAST procedure was confirmed by skin-conductance and self-report data to the test stimulus, but the data strongly support the abandonment of selecting subjects' fear levels on the basis of responses to paper-pencil inventories.

The behavioral assessment of human fears has largely been confined to stimuli that readily lend themselves to in vivo presentation (Kaloupek & Levis, 1980; Lang & Lazovik, 1963; Levis, 1969). Unfortunately, most clinical fears are not easily reproduced in an in vivo setting. In an attempt to address this issue, Burchardt and Levis (1977) developed a behavioral assessment procedure in which slides of a phobic stimulus are presented. The utility of their Behavioral Avoidance Slide Test (BAST) in discriminating between phobic and nonphobic subjects compared favorably to an in vivo procedure. Peterson and Levis (1985) extended the evaluation of BAST to a stimulus area not readily assessed by in vivo behavioral confirmation, bodily injury. Their stimulus material consisted of a slide of a mutilated face of a man. A series of 11 pictures of this stimulus were ordered on a dimension of size (distance) from small to large. Subjects were instructed to advance the slide when it appeared on the screen by pressing a button. Ten presses completed the series. The primary behavior index, response latency between buttonpresses, reliably discriminated between fear levels (predetermined by a paper-pencil inventory) and the content of the bodily injury and control slide series. Support for the contention that the behavioral response-latency measure reflected differences in fear level (the longer the latency to press, the greater the fear level) was obtained from the results of autonomic and self-report measures recorded during slide presentation.

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In the above study, a variable-exposure procedure was used. That is, once the slide appeared on the screen, the subject could control the stimulus duration by advancing or not advancing the slide series. Since an advance led to a potentially more aversive slide, the desire to escape the presented stimulus may have been in conflict with the tendency to avoid the next stimulus. The present study was designed to assess the potential methodological confounds associated with permitting subject control over the stimulus duration of each slide presentation and using a procedure in which the response task potentially presents an escape-avoidance conflict. To achieve this objective, the Peterson and Levis (1985) study was essentially replicated with the additional inclusion of a fixed-exposure test procedure that controlled the stimulus duration and removed the escape-avoidance conflict. A secondary purpose of the replication was to evaluate the use of an additional behavioral index, that of response force. Finally, the validity of dividing subjects into fear levels on the basis of responses to a paper-pencil inventory, a procedure questioned by data obtained from the Peterson and Levis study, was also assessed.

METHOD

Subjects

The subjects were 32 female volunteers from an introductory psychology course. As in the Peterson and Levis (1985) study, the subjects were divided into high- and low-fear conditions on the basis of their Injury/Death/Illness factor scores on Geer's (1965) Fear Survey Schedule II (FSS; Bernstein & Allen, 1969) and their responses to the Mutilation Questionnaire (MQ) of Klorman, Weerts, Hastings, Melamed, and Lang (1974). Subjects were included only if they scored in the upper or lower quartiles on both inventories as described by Peterson and

Levis (1985). The high-fear subjects had a mean FSS factor score of 6.14 (SD = 0.20) and a mean MQ score of 22.07 (SD = 3.85); the low-fear subjects had a mean FSS factor score of 3.06 (SD = 0.63) and a mean MQ score of 3.33 (SD = 1.68). These scores were comparable to those found in the Peterson and Levis study.

Apparatus

The apparatus was identical to that used in the previous study except for one change. The buttonpress response was changed to a squeeze of a hand dynamometer (Lafayette Instrument Co., No. 76608) to obtain a measure of response force. The output of the dynamometer was recorded by an electrical recording pen of the Beckman Dynagraph. The minimum force required for each pull was 5 kg.

Procedure

All procedures were identical to those used in the Peterson and Levis (1985) study except for the following changes. Prior to the start of the taped instructions, the subjects were asked to squeeze the hand dynamometer "as hard as you can" at three set intervals, to obtain an estimate of their maximum grip strengths. In the event of group differences, this value was to be used in a range-correction procedure. The only change in instruction was the phrase "hand dynamometer" substituted for "control button."

The same experimental and control slides administered to each subject, as well as the same dependent measures employed in the Peterson and Levis (1985) study, were used. The basic difference between studies was a comparison made between two different BAST procedures: variable exposure versus fixed exposure. Each procedure was tested with 8 high- and low-fear subjects. The variable-exposure procedure used in the previous study was briefly described in the introduction of this paper. In the fixed-exposure procedure, the subject was required to squeeze the dynamometer to produce the first slide. This, and each succeeding slide presentation, was shown for a 5-sec duration. The subject was asked to squeeze the dynamometer to cause the next image to appear as soon as she could following slide offset. There was no appreciable delay in this condition between a response and slide onset. The fixed procedure allowed for the recording of one additional latency, the first response that initiated the slide exposure. During the behavioral testing period, the experimenter, using a video monitor, formally recorded whether or not the subject had her eyes open and was facing the screen when the stimulus was being projected.

The last chance occurred at the conclusion of the second retest session, given 7 days after the first session. This change, which was administered after all other procedures had been completed, involved the addition of a "money" question involving an 11-point scale ranging from $0 to $100. The subjects were asked to indicate the minimal amount of money necessary to induce them to repeat the task. This question was included because the debriefing responses in the Peterson and Levis (1985) study indicated that such a question might differentiate fear levels.

RESULTS

Self-Report Inventories

The MQ inventory was readministered immediately prior to testing in Sessions 1 and 2. The means for the high-fear group were 19.07 (SD = 4.39) and 18.93 (SD = 4.83), respectively; the means for the low-fear group were 4.00 (SD = 1.41) and 4.33 (SD = 2.94), respectively. These means were comparable to those obtained during the group testing period.

Behavioral Indexes

Two behavioral indexes were analyzed: (1) latency of dynamometer response and (2) force of dynamometer response. The latency of the first response for the fixed-exposure condition was dropped to equate the response conditions with the variable-exposure condition. This resulted in 10 comparable data points per slide series. The mean total of bodily injury slide exposures for all subjects who completed the fixed-exposure task was 75 sec for each session. The variable-exposure task means were 87.2 and 81.2 sec for Sessions 1 and 2, respectively. These exposure differences were not associated with differences in response latency. The latency analysis involved two between-subjects factors (fear group and behavioral task) and three within-subject factors (sessions, slide type, and slide steps). The main effects for fear group and behavioral task were not significant, with most mean response latencies being less than 2.0 sec. The main effect for sessions was reliable [$F(1,25) = 6.74, p < .25$], reflecting faster responses during Session 2. However, an inspection of the latency data revealed that the median latency to the bodily injury slides for each of the 10 slide steps was longer for the high-fear than for the low-fear subjects, except for Slide Step 2 in Session 1 and Slide Steps 4 and 6 in Session 2. Furthermore, as the slide steps increased, the latency to respond became longer. This observation was supported by the finding of a four-way interaction (fear group × session × slide type × slide step) ($p < .05$). To assess fear-group differential effects to the obtained skewed latency distribution during Session 1, comparisons between fear levels were made at each slide step. Significant between-group differences using a Mann-Whitney U test occurred for the bodily injury slide at Steps 6, 8, and 9 ($p < .05$), with Step 7 approaching significance ($p < .10$).

The second behavioral index—force of each response as measured by the hand dynamometer—was initially analyzed in raw score units of millimeters of dynagraph pen deflection. A reliable main effect was obtained for slide steps ($p < .001$). There were significant interactions for behavioral task × slide type ($p < .05$), behavioral task × slide step ($p < .025$), and slide type × slide step ($p < .01$), as well as an interaction of all five factors ($p < .05$). A reanalysis of these data was conducted with range-corrected scores in an effort to simplify interpretation. Another between-subjects factor was also included—order of stimulus presentation. The main effect for slide steps ($p < .001$), and the interactions for behavioral task × slide step ($p < .025$) and slide type × slide step ($p < .005$) persisted, whereas the five-way interaction did not. The only significant result involving the fear-group effect was a three-way interaction with stimulus order and slide step ($p < .025$). Inspection of the data revealed that, relative to low-fear subjects, high-fear subjects squeezed the dynamometer with greater force to the bodily injury slides, with stronger responses occurring to the initial steps when the bodily injury slides was presented first.

Autonomic Measures

During the three 10-sec slide-presentation periods, a skin-conductance (SC) difference score was computed for level, amplitude of the orienting response, and frequency. The conductance-level (SCL) data yielded main effects of slide type [$F(1,27) = 5.99, p < .025$] and exposure period [$F(2,54) = 6.85, p < .005$] and a three-way interaction (slide type × exposure period × session) ($p < .025$). The SCL score was largest for the bodily injury slides, declined over exposures, and was more pronounced in Session 1. The orienting SC response analysis produced the same reliable differences as noted for the SCL data. The frequency data failed to yield any significant results.

The analysis of the phasic heart rate (HR) response during the three slide-presentation periods produced a main effect for session ($p < .05$) and a trend ($p < .10$) toward a fear group × slide type × beat interaction. The high-fear group tended to have the higher HR, especially to the bodily injury stimulus that showed a biphasic acceleration-deceleration pattern. A deceleration trend occurred in response to the control slide, whereas overall HR decreased across sessions.

Self-Report Fear Ratings

The subjects marked an Emotional Rating Scale (ERS) following the completion of the three presentations of each slide type during the physiological assessment period and following the completion of the behavioral slide test. The numerical self-ratings on the ERS were analyzed directly. The dimension was scored from +10 for *extremely pleasant*, through a neutral rating of 0, to −10 for *extremely unpleasant*. A four-way ANOVA of the ERS responses (fear group × session × assessment period × slide type) yielded main effects for fear group [$F(1,27) = 9.15, p < .01$] and slide type ($p < .001$). The predicted fear group × slide type interaction was significant [$F(1,27) = 15.52, p < .001$], with the high-fear group rating the bodily injury slides more unpleasant than did the low-fear group. A breakdown of this analysis revealed that there were no reliable differences for the ERS ratings at the end of the bodily injury slide behavioral task between the variable and fixed conditions for Session 1 (means = −3.29 and −5.67, respectively) or Session 2 (means = −3.29 and −5.13, respectively). The high-fear group rated the bodily injury stimulus as less unpleasant during the second session ($p < .05$), with a trend in the same direction occurring during the physiological assessment period ($p < .10$). A trend also existed for the subjects to rate the control slide more pleasant during the second session ($p < .10$).

The money question given at the end of the study also differentiated fear groups [$t(27) = 2.77, p < .01$], with the high- and low-fear group means being $6.86 and $0.87, respectively.

Correlational Analysis

A correlational analysis similar to that conducted by Peterson and Levis (1985) was performed with the addition of the average dynamometer force measure. To summarize, there were more correlations below the .10 and .05 levels during Session 1 (38 and 20, respectively) than in Session 2 (20 and 14, respectively). All significant correlations in Session 1 between the bodily injury ERS ratings and autonomic variables were in the expected direction. That is, the greater the physiological arousal, the more negative the self-rating. The relationship also held for the tonic SCL measure and control stimuli ERS. The significant correlations between the behavioral and physiological variables presented no clear pattern, especially for the dynamometer variables. The behavioral and self-report intercorrelations were all nonsignificant, which was not surprising given the lack of behavioral and autonomic fear-group main effects.

Finally, it will be recalled that a formal record was kept as to whether or not the subject appeared to be observing the screen during the slide-exposure periods. All subjects viewed each slide for the complete exposure period except for 4 high-fear subjects. These subjects failed to observe the bodily injury stimulus for one or more of the exposures during the prebehavioral exposure period. One of these subjects refused to participate in the second session.

A complete description of all of the analyses conducted on these data can be obtained from the SUNY Binghamton Science Library (see Peterson, 1974, Experiment 2).

DISCUSSION

Despite comparable selection procedures to those used in the Peterson and Levis (1985) study, only the self-report measures administered during testing yielded a significant main effect between high- and low-fear groups. These differences, although reliable, represented only marginal fear-level differences and clearly did not reflect extremes of the distribution. Although the behavioral and autonomic SC measures did successfully differentiate between the bodily injury and control slides for the high-fear subjects, the effects within and across sessions were considerably weaker than the effects reported by Peterson and Levis. For example, the behavioral latency measure started to differentiate fear levels with Slide 6, whereas this differentiation occurred in the previous study with Slide 2. It is clear after looking at the data as a whole that the high-fear subjects in the present study were not as afraid as those in the previous report. This is in spite of the fact the MQ scores were comparable to those obtained in the Peterson and Levis report and that they remained stable across sessions. A growing body of research (e.g., Kaloupek & Levis, 1980; Lick, Sushinsky, & Malow, 1977; McReynolds & Stegman, 1976) suggests that considerable accuracy may be lost in assigning subjects to fear levels on the basis of paper-pencil inventories. Peterson and Levis also expressed concern about the use of an inventory procedure and documented the occurrence of such misclassifications. They suggested that a more accurate classification of a subject's fear level could be achieved by the use of the BAST procedure. They recommended that high-fear subjects be defined as subjects who failed to make 10 presses or who produced an average response latency of 10 sec or greater. Excluding the subjects who refused to complete the study, only 1 subject in the present study met this criterion. The results of the present study, in conjunction with the Peterson and Levis study, strongly suggest against using paper-pencil inventories as a fear-level selection procedure. The problem with such inventories is that the descriptive words used on such tests may be too far removed on a stimulus dimension of arousal from a picture or in vivo exposure to the feared situation. The issue is not that self-report as an index of fearfulness is necessarily more variable or unreliable. Instead, the issue centers on the degree of comparability between the stimulus situation described on an inventory and that used in the experimental test. The accuracy of self-report as a fear-level selection procedure, as well as the relationship between self-report and other response channels, can be greatly improved by taking ratings to the actual test stimulus (Kaloupek & Levis, 1980).

The present study also failed to find any behavioral differences in response latencies between the variable- and fixed-exposure conditions. This occurred in spite of the fact that differences existed in slide-exposure time between procedures. However, the use of the fixed-exposure procedure clearly has methodological advantages over the variable procedure, and its use is recommended. The finding that the SC measures were successful in differentiating between slide type, and that the HR measures were not, replicates the finding of Peterson and Levis (1985). The use of HR as an autonomic measure of fear has been seriously questioned by others on methodological grounds (Elliott, 1974; Lacey & Lacey, 1970; Obrist, 1982; Rescorla & Solomon, 1967). The value of the dynamometer as another behavioral index shows promise but needs more experimentation, especially with higher fear subjects. The use of the money question did discriminate between fear groups, and the importance of providing an objective check on whether the subjects were visually avoiding the stimulus presentations was also supported. Finally, the use of BAST following the criterion recommendation of Peterson and Levis is recommended.

REFERENCES

Bernstein, D. A., & Allen, C. J. (1969). Fear survey: 2. Normative data and factor analysis based on a large college sample. *Behaviour Research & Therapy*, **7**, 399-402.

Burchardt, C. J., & Levis, D. J. (1977). The utility of presenting slides of a phobic stimulus in the context of a behavioral avoidance procedure. *Behavior Therapy*, **8**, 340-346.

Elliott, R. (1974). The motivational significance of heart rate. In P. A. Obrist, A. H. Block, J. Brener, & L. V. DiCara (Eds.), *Cardiovascular psychophysiology: Current issues in response mechanisms, biofeedback and methodology* (pp. 136-162). Chicago: Aldine.

Geer, G. H. (1965). The development of a scale to measure fear. *Behaviour Research & Therapy*, **3**, 45-53.

Kaloupek, D. G., & Levis, D. J. (1980). The relationship between stimulus specificity and self-report indices in assessing fear of heterosexual social interaction: A test of the unitary response hypothesis. *Behavioral Assessment*, **2**, 267-281.

Klorman, R., Weerts, T. C., Hastings, J. E., Melamed, B. G., & Lang, P. J. (1974). Psychometric description of some specific-fear questionnaires. *Behavior Therapy*, **5**, 401-409.

Lacey, J. I., & Lacey, B. C. (1970). Some autonomic-central nervous system interrelationships. In P. Block (Ed.), *Physiological correlates of emotion* (pp. 205-226). New York: Academic Press.

Lang, P. J., & Lazovik, A. D. (1963). Experimental desensitization of a phobia. *Journal of Abnormal & Social Psychology*, **66**, 519-525.

Levis, D. J. (1969). The phobic test apparatus: An objective measure of human avoidance behavior to small objects. *Behaviour Research & Therapy*, **7**, 309-315.

Lick, J. R., Sushinsky, L. W., & Malow, R. (1977). Specificity of fear survey schedule items and the prediction of avoidance behavior. *Behavior Modification*, **1**, 195-204.

McReynolds, W. T., & Stegman, R. (1976). Sayer versus sign. *Behavior Therapy*, **7**, 704-705.

Obrist, P. A. (1982). Cardiac-behavioral interactions: A critical appraisal. In J. T. Cacioppo & R. E. Petty (Eds.), *Perspectives in cardiovascular psychophysiology* (pp. 265-295). New York: Guilford.

Peterson, D. A. (1974). *The utility of a slide procedure in the assessment of mutilation fear.* Master's thesis, State University of New York, Binghamton.

Peterson, D. A., & Levis, D. J. (1985). The assessment of bodily injury fears via the behavioral avoidance slide-test. *Behavioral Assessment*, **7**, 173-184.

Rescorla, R. A., & Solomon, R. L. (1967). Two-process learning theory: Relationships between Pavlovian conditioning and instrumental learning. *Psychological Review*, **74**, 151-182.

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