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CONCEPTUAL COMPLEXITY AND SUSCEPTIBILITY TO LEARNED HELPLESSNESS

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Groups of conceptually complex and simple female subjects were exposed to escapable or inescapable noise, or no noise pre-treatments within an instrumental-cognitive learned helplessness paradigm. Subsequently, subjects completed anagram tasks, and their performance was evaluated in terms of complexity level and helplessness effects. Consistent with predictions, conceptually complex subjects performed better than the conceptually simple subjects after exposure to the inescapable noise condition which was designed to induce learned helplessness. As expected, these complexity differences in anagram performance were not observed in the escapable noise condition. In an interesting, but unexpected, finding the conceptually simple subjects showed greater performance decrements relative to complex subjects in the no noise condition on two of the dependent measures. Overall, the data suggest that conceptual complexity level does mediate the experience of learned helplessness. Specifically, it appeared that the conceptually complex subjects were less negatively affected than simple subjects as a result of exposure to an uncontrollable, aversive situation.

Exposure to aversive stimulation from which no escape is possible results in performance decrements in subsequent learning situations. This effect, known as learned helplessness, is explained by the expectancy that reinforcement and responding are independent (Seligman, 1975). The degree to which the learned helplessness effect is evident may be a function of the individual's interpretation of the helpless experience. The importance of this interpretive process has been recognized by numerous authors, particularly in the study of cognition as a mediator of stress reactions. For example, Lazarus (1976) has maintained that an individual's appraisal of a threatening situation influences the degree to which anxiety is experienced. In the learned helplessness literature Koller and Kaplan (1978) have emphasized both cognition and motivation in their two-process theory of learned helplessness, and more recently, Roth (1980) has revised the model of learned helplessness for humans in terms of moderating variables which affect the perception of noncontingency.

Conceptual complexity is a measure of an individual's information processing capacity. Its role in the cognitive appraisal process which operates in the learned helplessness phenomenon has not yet been examined. The purpose of this investigation was to assess the mediating effect of conceptual complexity on the experience of learned helplessness.

Integrative complexity theory (Schroder et al., 1967) attempts to account for both individual differences in processing capacity and environmental characteristics in determining the level of information processing which can be displayed at any time. Conceptual complexity is the person variable in the interaction,

which varies according to an individual's capacity to differentiate and integrate stimulus input. The environmental variable of interest in this investigation has been termed "noxity" by Schroder et al. (1967) and refers to the stressful or aversive nature of stimulus input. Theoretically, extreme levels of noxity produce a reduction in an individual's information processing capacity, resulting in performance decrements.

Persons having a limited capacity for differentiation and integration are labelled "conceptually simple", whereas those who are "conceptually complex" display a high level of these processing functions. Differentiation refers to the number of attributes or dimensions used in processing information about a stimulus situation, and integration refers to the number of concepts or combinatory rules which are used in processing this input, Of particular relevance to this investigation are those properties of complex and simple thinking which pertain to seeking information from the environment. Because complex thinkers are able to view stimuli along a variety of dimensions and can form a number of concepts based on these dimensions, they frequently require more detailed information for making decisions than do conceptually simple persons (e.g., Suedfeld and Streufert, 1966; Karlins and Lamm, 1967). Thus, when exposed to uncontrollable aversive stimulation, complex subjects may not demonstrate impaired problem-solving in a subsequent learning task, as typically found reported in previous learned helplessness studies (*e.g.,* Miller and Seligman, 1975). Instead, complex subjects may distinguish the learning task as a new situation and therefore remain active in their problem-solving efforts. In other words, because complex subjects are able to make finer discriminations among stimulus dimensions (Suedfeld, 1964) and seek more varied information about stimuli, they should be less susceptible to learned helplessness effects than conceptually simple subjects.

In order to test the hypothesis, groups of conceptually complex and simple female subjects were exposed to conditions involving inescapable or escapable aversive noise, or no noise, and subsequently completed a cognitive anagram task. Specifically, it was predicted that conceptually simple subjects would be more adversely affected by pre-exposure to inescapable noise than the conceptually complex subjects, but that they would perform as well as the conceptually complex subjects under the escapable and no noise conditions.

METHOD

SUBJECTS

Sixty female undergraduates from introductory psychology classes volunteered to participate in the study in return for academic credit. These subjects were assigned to high ($M = 2.68$) or low complexity ($M = 1.48$) groups, using a median split procedure based on their Paragraph Completion Test (PCT) scores (Schroder *et al.,* 1967). Following the initial testing session, each subject was randomly assigned to the inescapable noise, escapable noise, or no noise pretreatment condition.

MEASURE OF COMPLEXITY

The PCT was designed to produce a "content free" measure. of integrative complexity (Gardiner and Schroder, 1972). It is a semi-projective measure composed of five sentence stems, *e.g.,* "When I am in doubt . . .". For each item, subjects are asked to complete the stem and write an additional three sentences in response to it within 130 seconds.

The scoring procedure is based on the structural components of the subject's response. That is, raters are trained to ignore the attitudes expressed and the verbal ability of the subject. Scores for each paragraph range from 1 (when the response is generated by a single rule or concept) to 7 (when the response indicates multiple relationships between several perspectives). Two raters, previously trained to an interrater reliability criterion level of 0.80, independently scored each of the 60 PCTs used in this investigation and obtained an interrater reliability score of 0.93.

PROCEDURE

The procedure, equipment and cognitive task used in this investigation were a replication of the instrumental-cognitive helplessness paradigm reported by Miller and Seligman (1975).

Escapable and inescapable noise pretreatment conditions. Subjects in the noise conditions were exposed to fifty trials involving an aversive dB tone. Each trial was 5 sec in duration, with an internal interval of 10 sec. Subjects in the inescapable noise condition received exposure to the tone for the complete 5 sec trial duration and received feedback indicating that they had failed to escape the tone after each trial. Subjects in the escapable condition were able to escape the tone by pressing a button on the apparatus four times during the trial. These subjects received success feedback if they stopped the noise by making the correct button-pressing response.

No noise pretreatment condition. Subjects in the no noise group were seated outside the experimental room for approximately 12 minutes. They were informed that the delay was due to equipment failure. In actuality, however, this delay was included as a waiting period, comparable in duration to the noise pretreatment conditions.

Treatment condition. Immediately following the pretreatment phase, the anagrams task was presented. Subjects were allowed 100 seconds to solve each of the 20 five-letter anagrams.

Postexperimental phase. Following completion of the anagrams task, all subjects completed a postexperimental questionnaire. Using 1- 7 Likert scales, subjects in the inescapable noise condition answered five questions concerning the button-pressing task, for example, "Did you feel at any time that no matter what you did, you could not solve the button-pressing task?". Again using 1 - 7 Likert scales, all subjects from the noise and no noise conditions answered four questions relating to the anagrams, for example, "Did you feel at any time that no matter what you did, you could not solve the anagrams pattern?". The postexperimental questionnaires were included as manipulation checks for both phases of the experiment.

DEPENDENT MEASURES

The four dependent variables for the treatment phase of anagram performance were adopted from Miller and Seligman (1975). First, the mean response latency was recorded, for the 20 anagrams. Second, the number of trials to criterion for solving the anagram pattern was noted. The criterion was defined as three successive trials with a response latency of less than 15 seconds each. The third measure was the number of failures to solve, with failure to solve defined as the number of trials with latencies of 100 seconds. The final measure was the number of consecutive, successful anagram solutions which occurred prior to reaching the criterion for learning the pattern.

DATA ANALYSIS

Multivariate analyses of variance (MANOVAs) were conducted for the five-button-pressing task questions, the four questions concerning the anagram task, and for the four dependent variables reflecting anagram performance. When significant, the MANOVAs were followed by univariate analyses of variance. The hypothesized interactions were examined by tests of simple effects.

RESULTS

MANIPULATION CHECKS

Postexperimental questionnaire: Button-pressing task for the noise pretreatment conditions. Based on the Pillais Test, the MANOVA revealed a significant main effect for pretreatment condition, Pillais test value 0.56, approximate $F(5,32) = 8.13$, $p < 0.00005$. No other significant main effects or interactions were revealed by this analysis. Univariate analysis revealed that significant main effects

for pretreatment condition were obtained for question one (Did you feel at any time that no matter what you did, you could not solve the button pressing task?), $F(l,36)$ = 18,08, $p < 0.0001$, question two (Did you believe at any time that the button-pressing task to stop the tone was unsolvable - that it couldn't be solved?) $F(1,36) = 28.13$, $p < 0.00001$, and question five (How frustrated did you feel during the button-pressing tasks?), F (1.36) = 20.73, $p < 0.00006$. These analyses clearly indicate that subjects in the inescapable noise condition believed that they could not solve the task and were more frustrated than subjects in the escapable noise condition. These data confirm that the escapable/inescapable noise manipulations were successful.

Postexperimental questionnaire: Anagram task. Based on the Pillais test, the MANOVA conducted on these questions revealed significant main effects for complexity level, Pillais test value 0.20, approximate $F(4,51)$ 3.21, $p < 0.02$; and pretreatment condition, Pillais test value 0.31, approximate $F(8,104) = 2.38$, $p < 0.02$. Univariate analyses revealed that significant main effects for complexity were obtained for question one (Did you feel at any time that you could not solve the anagrams pattern?), $F(1,54) = 6.01$, $p < 0.018$; question two (Did you believe at any time that the anagrams task was unsolvable - that it couldn't be solved?), $F(1,54) = 5.52$, $p < 0.23$, and question four (How frustrated did you feel during the anagram task?), F (1,54) = 8.00, $p < 0.007$. Overall, relative to the simple subjects, the complex subjects believed that they had more control over solving the tasks and were less frustrated by the task.

Main effects for pretreatment condition were obtained for question one, $F(2,54) = 5.68$, $p < 0.006$; and question four, $F(2,54)$ 6.60, $p < 0.003$. These results indicate that subjects in the no noise and escapable conditions believed that they could solve the task more than subjects in the inescapable condition. Furthermore, subjects in the inescapable and no noise conditions were more frustrated than subjects in the escapable condition.

Summary of the manipulation check data. Overall, the results indicate that: (a) The experimental manipulations were successful; (b) the complex subjects perceived the anagram task to be more solvable and less frustrating than did the simple subjects; and (c) the subjects in the inescapable and no noise conditions were more frustrated by the anagram task than were those in the escapable noise condition.

DEPENDENT MEASURES: TREATMENT PHASE

Based on the Pillais test, the MANOVA conducted on these measures revealed only one noteworthy result, a main effect for complexity level which only approaches statistical significance, Pillais test value 0.16, approximate $F(4,51) = 2.43$, $p = 0.059$. Univariate analysis revealed that a significant main effect for complexity was obtained for mean response latency, $F(1,54) = 8.73$, $p < 0.005$. This result indicated that conceptually simple subjects were slower in arriving at solutions to the anagrams than complex subjects. The tests of simple effects for this measure revealed that, as expected, the performance of the conceptually simple subjects ($M = 33.57$ sec) was more adversely affected than was that of the conceptually complex subjects (M = 13.29 sec) by exposure to the inescapable noise condition. Interestingly, the conceptually simple subjects ($M = 34.95$ sec) were also more adversely affected by the no noise condition than were the complex subjects (M = 18.69 sec). As expected, there were no significant complexity differences in the escapable noise condition (conceptually simple subjects: $M = 21.77$ see; conceptually complex subjects: M = 19.91 sec).

Number of trials to criterion. Tests of simple effects revealed that, as expected, complex subjects (M = 8.5), did not perform differently from simple subjects (M = 7.6) in the escapable condition. However, as expected, simple subjects ($M = 14.2$) took more trials to reach the criterion level for solution than did complex subjects ($M = 6.1$) in the inescapable condition. No significantly complexity differences emerged in the noise condition (complex subjects: $M = 6.6$; simple subjects: $M = 11.0$).

Number of failures to solve. Once again, the tests of simple effects revealed no significant complexity differences for this measure in the inescapable condition (complex subjects: $M = 3.8$; simple subjects: $M = 4.5$) or in the no noise condition (complex subjects: $M = 4.2$; simple subjects: $M = 5.3$). However, in the inescapable condition the conceptually simple subjects ($M = 6.2$) showed considerably more failures to solve than did the conceptually complex subjects ($M = 3.0$).

Number of successful consecutive anagram solutions prior to reaching criterion. Tests of simple effects revealed that, in the inescapable condition, simple subjects required more practice with the anagrams to discover the solution pattern than did the complex subjects (complex subjects: $M = 0.30$; simple subjects: $M = 1.30$). This performance difference did not occur in the escapable condition (complex subjects: $M = 0.70$; simple subjects: $M = 0.70$). In an unexpected result, which is consistent with the findings observed for the response latency variable, conceptually simple subjects ($M = 1.30$) were observed to require more trials than the complex subjects ($M = 0.40$) in the no noise condition.

Overall, the results obtained for these dependent measures revealed considerable support for the predicted relationship between conceptual complexity and susceptibility to learned helplessness effects. As expected, the results for each variable showed that complex subjects performed better than conceptually simple subjects in the inescapable noise condition, but this complexity difference was not observed in the escapable noise condition. In other words, the inescapable pretreatment appeared to negatively affect the performance of the conceptually simple subjects. In an interesting, but unexpected finding, simple subjects were found to be adversely affected relative to the complex subjects by the no noise condition on two of the dependent measures.

DISCUSSION

Consistent with our prediction, the results suggest that learned helplessness is mediated by conceptual complexity. Relative to conceptually simple subjects, the anagram performance of the complex subjects was not adversely affected by exposure to the inescapable noise condition.

Hiroto (1974) found a somewhat similar pattern of results using locus of control as the cognitive mediating variable. Internally controlled subjects were less affected than externals by learned helplessness pretreatments. Thus, it might be argued that conceptual complexity and locus of control are highly correlated. However, M. Stein (pers. comm., 1978) reports extremely low correlations between locus of control and conceptual level: for 63 females, $r = 0.02$. These data suggest that our results are not confounded by the locus of control variable.

Another reasonable explanation for our data can be postulated. As previously suggested, complex subjects may be better able to discriminate between situations than simple subjects. Therefore, one would not expect the performance of conceptually complex subjects to be impaired by previous exposure to an inescapable (failure) condition. Using this argument, one would expect the conceptually simple subjects' performance to be impaired because they generalized from one lack-of-contingency situation to another. However, in the escapable condition the simple subjects may have experienced a feeling of control which allowed them to approach the anagrams task with the same effectiveness as the complex subjects. In other words, in the escapable condition the simple subjects may have generalized from one success situation to another.

This explanation may also elucidate the unexpected results for the no noise condition because the no noise waiting period may have been perceived as a situation involving loss of personal control, and, as a result, the conceptually simple subjects performed poorly on the anagrams. Since it appears that the no noise condition may have been perceived as an aversive pretreatment experience, future studies might employ a different control condition.

The present research supports both Hanusa and Schulz (1977) and Koller and Kaplan's (1978) contention that a cognitive or information-processing perspective

is important in learned helplessness research. The results suggest that conceptual complexity is an important mediating variable that should be considered when differential levels of helpless behavior occur across subjects. Furthermore, additional research is necessary to identify the noxity threshold level for complex subjects. That is, can a state of learned helplessness which impairs subsequent functioning be induced in complex subjects, and if so, how does their behavior compare with that of simple subjects? Answers to these questions will provide important information regarding the mediating role of information-processing in the learned helplessness phenomenon.

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