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Human learned helplessness as a function of sex and degree of control over aversive events

MARK A. WILSON and JEFFREY A. SEYBERT
University of Missouri, Kansas City, Missouri 64110

and

JOHN L. CRAFT
University of Iowa, Iowa City, Iowa 52240

The effect of partial control over aversive auditory stimuli was examined in a learned helplessness paradigm. During a pretreatment phase, three groups of female and three groups of male subjects were allowed control over the termination of an aversive tone on 0%, 50%, or 100% of the trials. In a second phase, they performed an escape-avoidance task using an apparatus different from that used in pretreatment. During this phase, the subject was allowed complete control over the termination or prevention of the tone on each trial. Partial control over aversive stimuli during pretreatment produced responding levels on the escape-avoidance task that were intermediate to those of subjects who had complete control or complete lack of control, but only for female subjects. These findings were taken as evidence that different degrees of learned helplessness may be produced by varying the degree of prior control and also that males and females differ in their susceptibility to learned helplessness treatments, a fact that may be related to differences in perceived lack of control.

It is well established that exposure to or experience with uncontrollable events results in impairment of subsequent performance. This finding has been labeled "learned helplessness" and has been reliably observed in both human and infrahuman subject populations (cf., respectively, Abramson, Seligman, & Teasdale, 1978; Maier & Seligman, 1976).

Typically, the helplessness paradigm includes a pretreatment phase and a test phase. In the pretreatment phase, subjects might, for example, be exposed to an aversive stimulus in one of two response-outcome conditions. The controllable condition consists of the presentation of an escapable aversive stimulus; that is, the stimulus is terminated when the organism emits the correct response. The correct response would be a panel or keypress response that results in escape from the aversive stimulus. The uncontrollable condition consists of the presentation of an aversive stimulus that is terminated irrespective of the subject's responding; that is, the subject's response or failure to respond has no effect on the termination of the stimulus. A third group of subjects receives no pretreatment prior to the test phase of the experiment. The test phase of the experiment follows pretreatment and involves the presentation of an aversive stimulus in an escape-avoidance task. During the test phase, the aversive stimulus is controllable (escapable) for all subjects. Generally, subjects who receive either escapable (controllable) aversive stimuli in the pretreatment phase or no pretreatment (control subjects) readily learn to escape or avoid. In marked contrast, subjects who have prior experience with inescapable (uncontrollable) aversive stimuli typically fail to respond in the subsequent escape-avoidance phase. It should be noted that the helplessness effect is not limited to situations involving aversive stimuli but has been demonstrated in appetitive situations, as well.

To date, several important aspects of helplessness in humans have been investigated: for example, the role of failure attribution (Dweck, 1975), whether helplessness can be brought under stimulus control (Dweck & Reppucci, 1973), the effects of internal vs. external expectancies of control (Hiroto, 1974), and the effects of task-related variables (e.g., Peterson, 1978). However, one variable that may be important in determining helplessness in humans, namely, degree of control (or lack of control) during pretreatment, has not yet been investigated. Indeed, there are surely many situations in everyday life in which individual responses only partially control outcomes. In other words, situations certainly arise in which the individual's response produces some specific outcome in some cases and fails to do so in other, similar instances, that is, in situations of partial controllability (and, also, therefore, partial uncontrollability). It is to this possiblity that the present research was addressed. Specifically, we attempted to determine the effects of different degrees of uncontrollability during pretreatment on a subsequent escape-avoidance task. In addition, the present study was designed to investigate the differential effects, if any, of the sex of the subjects.

Requests for reprints should be sent to J. A. Seybert, Department of Psychology, CB Annex, University of Missouri, Kansas City, Missouri 64110.

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METHOD

Subjects

Subjects were 30 male and 30 female students; 30 (15 males and 15 females) were freshmen or sophomores at a small private midwestern college, and the other 30 (15 males and 15 females) were freshmen or sophomores at a nearby public high school. The subjects volunteered to participate following an announcement in their classes, and they had no prior experience with the present or similar experimental procedures.

Apparatus

The apparatus consisted of two response units, one used in pretreatment and one used on test trials. The two units were located in the same room. The pretreatment apparatus was a slightly modified reaction time display including a warning light and two telegraph keys. The test apparatus was a modified version of a meterstick manipulandum described by Craft (1973).

A Heath audio generator (Model IG-72) was used to deliver an auditory stimulus of 90 dB at 100 Hz to the subjects. A Hunter digital clock (Model 120C) was used to measure reaction time to stimuli, when reaction was possible. Manual switches controlled whether subjects received the warning light, effectiveness of response, and whether the counter on the display would be advanced. A Wollensak tape recorder was used to deliver the experimental rationale and instructions to the subjects.

Procedure

Equal numbers of both male and female college and high school subjects were randomly assigned to the cells of a 3 by 2 by 2 factorial design with pretreatment condition (helplessness–H, 100% uncontrollability during pretreatment; partial helplessness–PH, 50% uncontrollability during pretreatment; and nonhelplessness–NH, 100% controllability during pretreatment), sex (male and female), and age (high school and college) serving as the factors. All subjects received the same tape-recorded instructions. The instructions emphasized to the subjects that they were participating in two separate experiments.

The subjects were then given a sample of the tone and the instructions for the pretreatment phase, which, in general, directed them to attempt to turn off the tone whenever it came on.

The pretreatment consisted of 50 trials with a mean intertrial interval (ITI) of 10 sec. The subjects received no warning of the onset of the aversive tone. In pretreatment, response effectiveness (keypressing) was varied according to the condition in which the subjects served.

In the NH groups, the subjects could terminate the tone after onset by pressing either telegraph key. In the H groups, the subjects could do nothing to terminate the tone, and at the end of 5 sec, the experimenter terminated the tone. In the PH groups, the subjects could terminate the tone on 50% of the trials after onset of the tone. On the remaining 50% of the trials, the PH subjects could do nothing to terminate the tone (tone was again terminated by the experimenter after 5 sec). According to condition, then, the subjects could control the tone on 100% of the trials (NH), 50% of the trials (PH), or 0% of the trials (H). Response effectiveness in the PH condition was varied such that on each consecutive block of 10 trials, 5 trials were controllable and 5 were uncontrollable.

Following the pretreatment trials, the subject was seated at a different table located on the opposite side of the room in front of the test apparatus, which was covered during pretreatment. The movable block was at the midpoint of the stick. The subject was again directed to attempt to turn off the tone following its onset.

During the test phase of the experiment, all subjects served under the same response-effectiveness condition, consisting of a possible 20 signaled trials with a 5-sec warning light/stimulus light interval and a 5-sec presentation of aversive stimuli, for a total of 10 sec. Hence, the subject could respond any time within a 10-sec interval to escape or avoid the tone. A mean ITI of 15 sec was used. On any one trial, one of the two hidden microswitches, if closed, would terminate the tone; the other would not. The subject could escape the tone on all trials by sliding the microswitch to one end of the stick on one trial and then sliding it to the opposite end on the following trial. The subject could avoid the tone by performing the same response during the warning light/stimulus light interval. The side that was initially effective was varied such that for 30 subjects the right side would terminate first and for 30 subjects the left side would terminate first. In the absence of a correct response, the experimenter terminated the tone after 5 sec. After the subject performed three consecutive escape or avoidance responses, or at the end of 20 trials, the experiment was concluded.

RESULTS

During pretreatment, the subjects in both the NH and PH conditions readily escaped the aversive tone on all trials on which such escape was possible. Escape was not possible, of course, for the subjects in the H conditions. During testing, the number of trials to reach the criterion of three successive correct responses, the total number of failures to escape, and response latencies on the criterion trials were recorded for each subject; these data may be seen in Figure 1. In terms of both trials to criterion and failures to escape, performance for female subjects in the escape-avoidance phase seems to have been a direct function of degree of control; for example, the group with the least control during pretreatment (Group H) exhibited the greatest number of trials to reach criterion responding, and the group with the most control during pretreatment (Group NH) exhibited the least number of trials to criterion. In marked contrast, performance for male subjects for both trials to criterion and failures to escape seems to have varied little as a function of degree of control. In addition, there seems to have been no appreciable differences in any of the dependent variables as a function of age (in fact, there were no statistical effects of age, and therefore Figure 1 presents the data collapsed across this variable). The results of 3 (degree of control) by 2 (sex of subject) by 2 (age) analyses support the above conclusions. The main effect for degree of control was significant for both

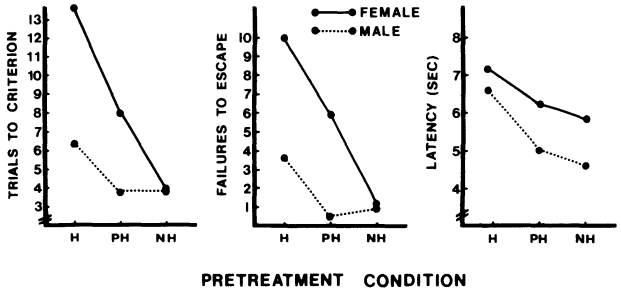

Figure 1. Trials to criterion, failures to escape, and latency (in seconds) as a function of sex of subject and degree of control during pretreatment.

the trials-to-criterion and the failures-to-escape measures [Fs(2,48) = 9.02 and 7.57, respectively; ps < .001]. In addition, the sex-of-subject main effect for the same two dependent variables was also significant [Fs(1,48) = 15.92 and 12.34, respectively; ps < .001], as was the interaction of Degree of Control by Sex of Subject [Fs(2,48) = 3.47 and 3.41, respectively; ps < .05]. Subsequent evaluation of the degree-of-control group means for female subjects using post hoc comparisons (Newman-Keuls tests at the .05 level of significance) indicated, for trials to criterion, that Group NH had fewer trials than Group PH and Group PH had fewer trials than Group H. Similarly, Group NH had fewer failures to escape than Group PH, and Group PH had fewer failures to escape than Group H. Thus, for female subjects, on both the trials-to-criterion and the failures-to-escape variables, the groups were ordered NH > PH > H, in terms of performance on the escape-avoidance task in the second phase of the experiment. Importantly, the PH group was significantly intermediate to the NH and H groups, indicating that the present pretreatment procedure produced "partial helplessness" in the PH subjects.

Quite a different picture from that obtained with female subjects emerged from examination of male H and PH groups (the two groups of male subjects for which the largest differences were observed). For both trials to criterion and failures to escape, no significant differences were obtained between the PH and H groups. To further clarify the sex main effect, comparisons were carried out between male and female H groups, revealing that, for both trials to criterion and failures to escape, the groups were significantly different. Similar comparisons between male and female PH groups produced significant differences for both trials to criterion and failures to escape. There were no differences between the male and female NH groups for either dependent variable.

The analysis of the third dependent variable, response latencies, revealed only a marginally significant effect for degree of control, with the H groups tending to respond slower [F(2,48) = 2.74, p = .07], and a significant main effect for sex [F(1,48) = 3.75, p < .05], indicating that females generally responded slower than males. Additionally, the degree of Control by Sex interaction did not reach an acceptable level of significance (F < 1).

Due to the consistent differences between degree-of-control groups as a function of sex (as reflected in the significant Degree of Control by Sex interaction), a post hoc examination of all the high school subjects was conducted using the Rotter (1966) I-E scale to determine if the males and females differed in their scores.[1] Hiroto (1974) has pointed out that subjects determined to be "external" on the I-E scale tend to be more susceptible to helplessness manipulations. A 3 (degree of control) by 2 (sex of subject) factorial analyses of variance performed on these data revealed that a significant difference did exist between the male and female subjects, with females scoring much higher (i.e, more external) than males [F(1,24) = 5.47, p < .02]. No other statistically significant differences were obtained. In an attempt to assess the subject's perceptions regarding the effectiveness of their responses, they were asked, following the experimental procedure, whether they felt they had control over the experiment. Every subject in the H conditions reported that they felt they did not have control. All but one subject in the NH conditions reported that they felt they had control. Interestingly, subjects in the PH groups seemed unsure of control. While some reported that they thought they had control, others thought they did not; however, most subjects in this condition stated that "maybe" they were in control or that they "didn't know" or were "not sure." Thus, our partial helplessness manipulation seems to have induced a perception of partial control in our subjects, a fact attested to by the above self-report data, as well as by the intermediate nature of the testing results for the PH subjects.

An informal analysis was conducted on a possible confounding variable; namely, the subjects in the H groups received 5 sec of aversive tone on each trial and hence were not yoked to NH group subjects. Inescapable trials for the PH groups were also of 5 sec duration and unyoked. Because of the possibility that exposure to differing duration of aversive tone might produce differential stress, subjects were questioned as to how aversive they considered the tone to be. Results confirmed those reported by Hiroto (1974), in that no differences were found between ratings and most subjects rated the tone as moderately aversive.

DISCUSSION

The present findings revealed that female subjects who received prior experience with inescapable aversive tone failed to escape more often and took a greater number of trials to reach criterion in a subsequent escape-avoidance task than subjects who received prior escapable aversive tone. Moreover, the present results also demonstrated that the response decrement produced by inescapability can be reduced, but not alleviated, by allowing the subjects partial control over aversive tone during pretreatment. That is, the present results strongly suggest that learned helplessness is not necessarily an all-or-none effect. Partial control over an aversive stimulus in pretreatment results in intermediate levels of responding in relation to those of subjects who have had prior experience with either complete control or complete lack of control. Hence, the notion of learned helplessness can be extended not only to explain the failure to respond (resulting from the expectation of complete lack of control over aversive stimuli), but also to explain reduced levels of responding (resulting from the expectation of only partial control over aversive stimuli).

In the present study, it seems that the point at which the expectancies of uncontrollability are aroused may very well have been different for male and female subjects. Although such a sex difference is, in some sense, troublesome, a possible explanation for it can be seen in the literature. Rotter (1966) cites data that indicate that females, among other groups, are particularly susceptible to feelings of lack of control. He suggests that many females see control over events that influence their lives as being external to themselves. Hiroto (1974) reports that subjects who were determined to be "external," as determined

by the James' DeKalb Survey Test developed from Rotter (1954), were found to be more helpless when subjected to inescapable tone than were those determined to be "internal." Similarly, Jones, Nation, and Massad (1977) have indicated that externals are more responsive to learned helplessness manipulations than are internals. The present data have revealed a similar finding; namely, female subjects scored significantly higher on the Rotter (1966) I-E scale, indicating that they were more "external." Thus, it is not surprising that they were more sensitive to the present learned helplessness manipulations. In addition, similar patterns of behavior have been observed in children; girls have been found to be more likely to exhibit helplessness than are boys (e.g., Dweck & Busch, 1976; Dweck, Davidson, Nelson, & Enna, 1978).

Finally, it should be noted that a control condition usually employed in animal helplessness studies (i.e., a naive, nonpretreated group) was not used in the present experiment. There are a number of reasons for this exclusion: For example, Altenor, Kay, and Richter (1977) have indicated that such a control condition may not be appropriate in investigations of learned helplessness. In addition, several studies (e.g., Jones et al., 1977; Seybert, Gilliland, Wilson, McClanahan, & Vandenberg, Note 1; Seybert, Wilson, & Vandenberg, Note 2) have shown that naive human subjects (or subjects in a no-pretreatment condition) perform no differently on a subsequent learning task than do subjects who experience 100% controllability in the pretreatment phase (a condition that was used in the present study). Thus, we felt that a naive or no-pretreatment control condition would provide no additional important information.

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NOTE

1. It may be noted that only high school students were contacted to participate in the post hoc examination for I-E differences. College subjects were not included due to the large numbers who could not be reached to participate. However, since half of the subject pool was tested and college and high school student groups did not differ significantly from each other on any of the learned helplessness dimensions employed here, the omission of college students is of negligible consequence.

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