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Learned Helplessness and Superstitious Behavior as Opposite Effects of Uncontrollable Reinforcement in Humans

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Learned helplessness and superstition accounts of uncontrollability predict opposite results for subjects exposed to noncontingent reinforcement. Experiment 1 used the instrumental–cognitive triadic design proposed by Hiroto and Seligman (1975) for the testing of learned helplessness in humans, but eliminated the "failure light" that they introduced in their procedure. Results showed that Yoked subjects tend to superstitious behavior and illusion of control during exposure to uncontrollable noise. This, in turn, prevents the development of learned helplessness because uncontrollability is not perceived. In Experiment 2, the failure feedback manipulation was added to the Yoked condition. Results of this experiment replicate previous findings of a proactive interference effect in humans—often characterized as learned helplessness. This effect, however, does not support learned helplessness theory because failure feedback is needed for its development. It is argued that conditions of response-independent reinforcement commonly used in human research do not lead to learned helplessness, but to superstitious behavior and illusion of control. Different conditions could lead to learned helplessness, but the limits between superstition and helplessness have not yet been investigated.

Consider the following experiment: Triads of college students are told that a loud tone will come on from time to time. They are exposed to identical pattern, intensity, and duration of tones. One of these groups (Control) is just told to sit and listen to the tones. The other two groups (Escape and Yoked) are told that there is something they can do to stop the tones. But whereas this is true for the Escape group, Yoked subjects

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receive the same pattern and duration of tones that had been produced by their counterparts in the Escape group. The amount of noise received by Yoked and Control subjects depends only on the ability of the Escape subjects to terminate the tones. The critical factor is that Yoked subjects do not have control over reinforcement (noise termination) whereas Escape subjects do, and Control subjects are presumably not affected by this variable. All three groups are then tested in a subsequent controllable cognitive test task.

Two opposite sets of predictions can be derived from the literature regarding both the judgments and behavior of the Yoked subjects during both the training and test phases. The most basic predictions concern the noncontingent training phase. On the one hand, a superstition account of uncontrollability (Herrnstein, 1966; Skinner, 1948) would predict that Yoked subjects will not learn that outcomes are response-independent, and that superstitious responses will become conditioned *during* exposure to noncontingent reinforcement. On the other hand, learned helplessness theory (Abramson, Seligman, & Teasdale, 1978; Seligman, Maier, & Solomon, 1971) predicts that *during* exposure to the uncontrollable phase, the Yoked subjects will learn that they cannot control noise termination and will become passive. An additional issue concerns transfer to the test phase: whereas superstition theory does not directly predict impaired performance in the cognitive test task,[1] learned helplessness theory predicts that learning of response–outcome independence during the previous phase may lead—if other conditions are present—to expectancies of noncontingency in the test phase and that this transfer will cause impaired performance in the Yoked group.

The above experiment was proposed in 1975 by Hiroto and Seligman for the testing of learned helplessness theory in humans, and multiple variations of this or the other similar designs that they used, are ubiquitous

[1] A more traditional, and quite different, interpretation of the helplessness/superstition debate was developed in the context of animal learned helplessness research using electric shock as the aversive stimulus and showing impairment effects in a subsequent instrumental test phase. Superstitious behavior was proposed as a post hoc alternative explanation for the interference effect: if any response becomes superstitiously conditioned by shock termination, it is probably a passive response. Given that the test phase generally required active responses, Yoked subjects were thought to be at a disadvantage by having previously learned a passive response (Bracewell & Black, 1974). Several variations of this hypothesis have been repeatedly tested during many years. Early experimental results seemed to disconfirm it (Maier, 1970), but recent evidence suggests that inactivity level during pretreatment is a reliable predictor of subsequent interference (Balleine & Job, 1991). However, for conditions like the present one, involving only reinforcement—with no shock and no punishment—superstitious theory cannot predict conditioning of passive behavior. It could only expect interference if the response learned by most Yoked subjects during the instrumental escape task happened to be incompatible with the requirements of the cognitive task.

in the human literature on the effects of uncontrollable outcomes since then. There were, however, several demonstrations of superstitious behavior in humans exposed to noncontingent reinforcement, prior to the introduction of learned helplessness theory (e.g., Wright, 1962). The behavior of subjects in this tradition was not passive and was compared to human superstition because it was persistent even though it did not cause the desired events.

These two opposite predictions have not yet been tested against one another. Superficially, there seems to be much more evidence on learned helplessness than on superstitious behavior in humans. But this could be due to the fact that research conducted on the former has been more extensive during the last decades. Whereas the superstition tradition was born in 1948 (Skinner, 1948) and "buried" in 1971 (Staddon & Simmelhag, 1971; see also Staddon, 1992), learned helplessness research began in 1967 (Overmier & Seligman, 1967; Seligman & Maier, 1967) and is still an active area of research that has widely attracted the interest of applied psychology.

According to the superstition view, and contrary to learned helplessness, learning depends on response–outcome contiguity and even accidental pairings are assumed to strengthen the response (see also Maier, 1989). Many experiments have provided empirical evidence supporting the tendency of humans exposed to noncontingent reinforcement to behave superstitiously (e.g., Bruner & Revusky, 1961; Catania & Cutts, 1963; Wright, 1962; Yellott, 1969). Experimental reports on the illusion of control have been consistent with the superstition tradition, showing that humans tend to believe that they have control over noncontingent reinforcement (Alloy & Abramson, 1979; Langer, 1975; Wortman, 1975).

At the same time, it is difficult to find unequivocal evidence of learned helplessness in humans. Although it is known that failure and uncontrollability are not synonymous, and that uncontrollability—rather than failure—is the critical factor in learned helplessness theory (Abramson *et al.*, 1978; Seligman, 1975), the actual induction tasks *used* by Hiroto and Seligman (1975) and its replications included a failure feedback manipulation that informed the subjects that they failed to control noise termination or that they failed to solve cognitive problems.

The use of failure feedback has been widely criticized (e.g., Blaney, 1977; Buchwald, Coyne, & Cole, 1978) and has led to a great deal of confusion around the learned helplessness concept. Most experiments in the human tradition are better characterized as testing the effects of success feedback versus failure feedback than the effects of controllable versus uncontrollable outcomes. Not surprisingly, many of them are frequently interpreted in terms of failure theories, like the egotism hypothesis (Frankel & Snyder, 1978) or experimentally induced failure (Buchwald *et al.*, 1978; Coyne, Metalsky, & Lavelle, 1980), that should be irrelevant to experiments testing for the effects of uncontrollability rather than failure. In this way, learned helplessness's most basic prediction remains untested and results become inconclusive. It is not possible to know, from those experiments, whether subjects would spontaneously learn that noise termination is independent of their behavior, or whether on the contrary, they would behave superstitiously and believe that their responses are controlling the outcome.

EXPERIMENT 1

This experiment tests for learned helplessness versus superstitious behavior in humans exposed to uncontrollable noise, in a situation where alternative explanations such as "failure feedback" may not apply if subsequent deficits are encountered. The overall procedure was described in the first paragraph of the introduction. It represents the "instrumental–cognitive" experiment proposed by Hiroto and Seligman (1975) but does not include the failure light that was described in Hiroto and Seligman's procedure and that has also been used in its replications (for a recent replication, see Miller & Tarpy, 1991, Experiment 2). Here, subjects will be let free to judge on their own whether or not they are controlling the outcome.

If superstitious behavior and illusion of control are to appear when humans are exposed to noncontingent reinforcement, they should appear during the training task. If this were true, uncontrollability of reinforcement would not be perceived, and thus, according to learned helplessness theory, deficits should not be expected during the test phase. On the other hand, if learned helplessness is to be developed by humans exposed to uncontrollable outcomes, subjects should not develop illusion of control and superstitious behavior during training, but should learn that they cannot control noise termination and show impaired performance during the subsequent test phase.

Method

Subjects

Forty-two undergraduates from Deusto University volunteered for the experiment. Among the individual variables that may influence results in this experiment, depression (Abramson & Alloy, 1981; Schwartz, 1981a, 1981b) and anxiety (Coyne *et al.*, 1980; Lavelle, Metalsky, & Coyne, 1979) seem to be the most relevant, and thus, subjects' scores on these factors were assessed individually just before the experiment. The questionnaires used were the Spanish adaptations of the Beck Depression Inventory (BDI) (Conde, Esteban, & Useros, 1976) and of the Spielberg *et al.*'s State Anxiety Inventory (1970/1982). Typing speed with the computer keyboard was also measured just before the experiment. Subjects were required to type, as rapidly as possible, numbers from 100 to 80, all of them followed by the return key, and the computer registered the time used for this task. A significant positive correlation was found between BDI and state anxiety scores ($r = .72$, $p < .001$). No significant correlations were found between typing speed, anxiety, or depression and any of the dependent variables. Groups were homogeneous in their depression, state anxiety, and typing speed scores prior to treatment ($ps > .1$). Subjects had no computer experience.

Procedure

Instrumental treatment. The experiment was conducted using a personal computer and subjects were run individually. Following Hiroto and Seligman (1975), the aversive stimulus used for the treatment phase was a 3000-Hz tone with a maximum duration time of 5 s. The Control group received the same instructions as in Hiroto and Seligman (1975):

"From time to time a loud tone will come on for a while. Please sit and listen to it."

Instructions for the Escape and Yoked groups, however, were modified from Hitoro and Seligman. In their original instructions, they described two feedback lights as telling the subjects whether they had controlled the tones or whether they had not controlled the tones and the tones had stopped automatically. These instructions were here modified in order to let the subjects judge on their own whether or not they were controlling tone termination. As in the Hiroto and Seligman's experiment, Escape and Yoked subjects were induced to try to stop the tones:

"From now on, imagine that the numbers 1, 2, & 3 are the only keys in the keyboard.

From time to time, a loud tone will come on for a while. Try to find the way to stop it. You may either type a number or do nothing. If your response is a number, it can have 1 or 2 digits, but there cannot be two equal digits on it. For example, some possible numbers could be 2, 21, 13, 1 . . . But 11, 22, and 33 are not valid.

While the tone is on, you can try several responses. Tones have a maximum duration time of 5 s. Your task is to find the way to stop it as rapidly as possible, and to stop as many tones as possible."

Therefore, there were 10 possible responses[2] including passive response. Only "21" was correct in the Escape group, and none in the Yoked group,

[2] The selection of only 10 possible responses and the restriction of nonrepeated digits greatly constrain possible superstitious behavior, but they were judged necessary due to preliminary research conducted during the implementation of the escape computer program. These preliminary studies showed that with more response possibilities many Escape subjects were not able to learn the correct cue.

for which the duration of the tone was preprogrammed independently of the subjects' behavior. The correct response terminated the tone in the Escape group. If the response was not correct, the tone continued until a correct subsequent response was made or 5 s had elapsed. There were 40 trials in this phase. Following the last trial, the next display asked the subjects: "What was the way to stop the tone?"

Measurement of dependent variables during the training task is not common in this type of experiment. However, it seemed important to record what subjects were doing during this phase in order to assess their possible superstitious behavior. A subject was classified as superstitious if she or he repeated the same response or pattern of responses during the last *n* trials of the task and confirmed this superstition when asked about the correct cue to stop the tone. Superstitious behavior sometimes changes over time (Skinner, 1948), or may be interrupted for one or two trials and then recovered. For instance, a superstitious response may be typing number "32" from the tenth trial to the last one, but it can also happen that a subject typing 32 as his or her superstitious response, may, after some trials, change to "3," or just have a couple of "errors" but continue typing "32" after that (see also Herrnstein, 1966). Subjects repeating a response or pattern during various trials but eventually developing a random pattern were not classified as superstitious (for some examples of behavior classified as superstitious and nonsuperstitious see Fig. 1).

Cognitive test. Immediately after completion of the treatment phase, the cognitive test task was presented to all subjects through the computer display. Anagrams were preceded by a 1-s, 3000-Hz tone that was used to help transfer from the training to the test phase. Instructions for this task were as follows:

"Now you will see some words that have their letters scrambled. Each time that one of these mixed up words is displayed, you will have to type, as fast as possible, the real word that those letters can form.

There may be an order or pattern common to all the words.

If you make a mistake, the same anagram will be presented again, so that you may try again as long as you are in time. The maximum time allowed for each anagram is 100 s."

The 20 anagrams were solvable by the same pattern. The pattern was the same as that in Hiroto and Seligman (1975). After the last anagram, the next display asked the subject, "What was the letter order?"

Dependent variables measured during the anagram test phase were the same as those in Hiroto and Seligman (1975): (a) number of failures to solve, defined as the number of trials with latencies of 100 s, the point at which the trial ended; (b) mean latency of correct response for the 20 anagrams; (c) criterion trial for anagram solution, defined as the first trial in which all the remaining anagrams were solved in less than 10 s.[3] If there were no anagrams solved in less than 10 s, or if the subject was not able to specify the letter order at the end of the task, the 20th trial was marked as criterion.

Postexperimental questions. The following questions were presented to the Escape and Yoked groups, one display at a time, after completion of the test phase: (1a) During the first task, which percentage of the tones were you able to terminate?; (1b) How certain are you about that? (from 0 to 100); (2a) In the first task, which percentage of the tones were terminable? (in other words, which percentage of the tones could you have stopped if you had made the best of the task?); (2b) How certain are you about that? (from 0 to 100). Finally, all subjects were carefully debriefed.

Results and Discussion

Instrumental Treatment

During the treatment phase, superstitious behavior was recorded in 11 of the 14 subjects of the Yoked group, and it was confirmed by their answer to the item that asked them about the way to stop the tone. Mean percentage of superstitious responses was 43.57%, meaning that, on the average, subjects repeated the same response or pattern to the end of the trial sequence on 43% of the trials. Not one subject realized that there was no cue to stop the tone. When asked what was the way to stop the tone, the three nonsuperstitious subjects answered that they were not able to learn it but not that there was no cue. Figure 1 shows some examples of Yoked subjects' behavior during this phase.

When asked about the percentage of tones that they were able to terminate and about the percentage of terminable tones, Yoked subjects showed illusion of personal control and task controllability. Means and standard deviations for these variables are shown in Table 1. Although the difference between the judgment of control in the Escape and Yoked groups was significant (Mann–Whitney $U = 54.0$, $p < .05$), the judgment of control in the Yoked group represents illusion of control because these subjects had no control but believed that they had controlled 46% of the tones, whereas Escape subjects believed that they had controlled 69%

[3] This definition is slightly different from the one used by Hiroto and Seligman (1975). They defined criterion as "subject solving three consecutive anagrams in less than 15 s each." However, given that the purpose of this variable is to assess whether or not subjects have learned the letter order, it appeared that solving three consecutive anagrams did not mean that subjects knew the pattern unless they kept this performance to the end of the task. This definition has been more sensitive: a significant difference between groups is seen in Experiment 2, whereas Hiroto and Seligman's (1975) results did not show an interference effect in this variable.

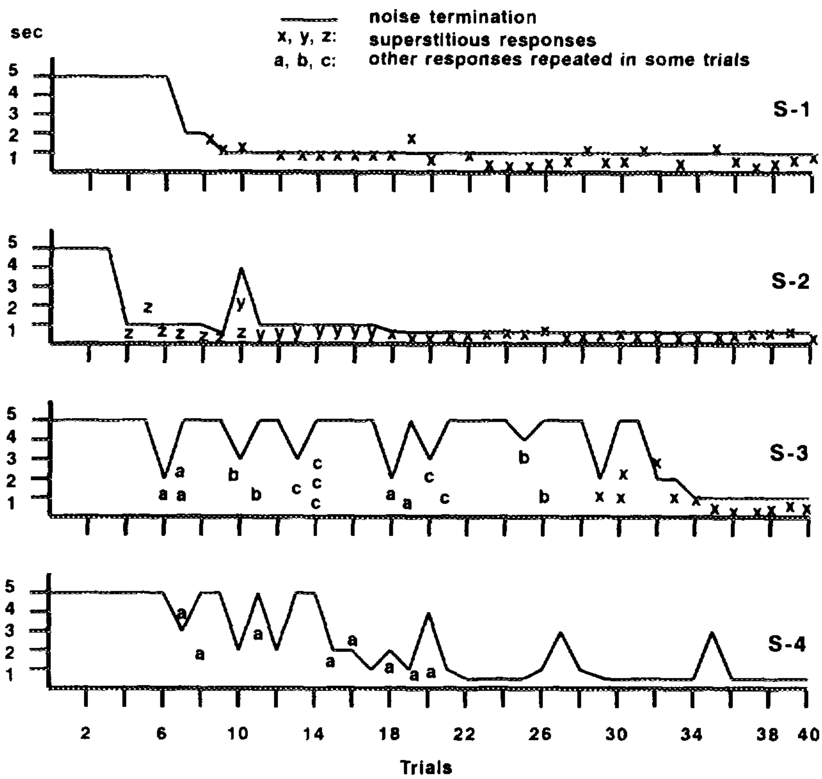

FIG. 1. Examples of Yoked subjects' behavior that was classified as superstitious and nonsuperstitious during the noncontingent training phase in Experiment 1. The line represents the point at which the tone—and trial—terminates, depending on the behavior of the counterpart Escape subject. Observation of the recorded patterns suggests that reinforcement distribution could be an important variable in the development of superstitious behavior, with more random patterns of reward distribution leading to lower degrees of superstitious behavior. This variable, however, is not explicitly included in experimental control in the triadic design used for the present purposes (i.e., each Yoked subject receives a different distribution and percentage of reinforcement). Points where no responses have been represented indicate "random" behavior (or at least, no clearly observable superstitious pattern).

but they had actually terminated 78% of the tones. Regarding the judgment of task controllability, Yoked subjects did not significantly differ from Escape subjects ($p > .1$). Both Escape and Yoked subjects believed that the task was highly controllable. Escape and Yoked subjects did not significantly differ in their certainty ratings to these questions (ps $> .5$).

It has been suggested that judgments of control may be based on the heuristic of "percentage of reinforcement" (Jenkins & Ward, 1965). In fact, in a triadic design, the actual control that the Escape subjects exert

TABLE 1
Means and Standard Deviations for Training and Test Task Variables, by Group, for Experiment 1

Group	Training		Test		
	Judgment of control	Judgment of controllability	Trials to criterion	Failures to solve	Mean latency
Escape					
M	69.43	97.79	13.28	1.28	19.79
SD	22.51	6.69	4.92	1.59	12.86
Yoked					
M	46.36	84.64	12.86	2.07	28.01
SD	30.14	28.59	5.23	1.49	14.27
Control					
M	—	—	14.86	2.35	29.10
SD	—	—	5.99	2.06	14.77

over noise termination coincides with the "percentage of reinforcement," and also with "percentage of correct responses." The mean value for these three "equivalent" heuristics in the Escape group was 78.56%. And mean judgment of control was 69.43%. The correlation of these two dependent variables was .86 ($p < .001$). Any of these three heuristics may have been used by the Escape group to judge the degree of control that they had over noise termination.

In the Yoked group, however, these three heuristics were not coincident: the actual control that the Yoked group exerted over noise termination was zero, but the percentage of reinforcement that Yoked subjects received was determined by Escape subjects. And there were no correct responses for this group, although subjects behaving superstitiously believed that their responses were correct. The heuristics used by Yoked subjects could be any of the above. Their mean judgment of control was 46.36%. Thus, they did not seem to detect the actual control of zero that they had over the outcome, nor did they seem to base their judgment on the percentage of reinforcement received (same as that for the Escape group, i.e., 78.56%): correlation between percentage of reinforcement and judgment of control was .46, *ns*. The percentage of "correct" (superstitious) responses (average 43.57%), however, gave a better estimate of the heuristic that the subjects may have been using. Correlation between judgment of control and percentage of superstitious responses was .72, $p < .01$. Given that most superstitious responses were reinforced (responses not reinforced during the early trials were abandoned), the "percentage of superstitious responses" can be considered an estimate of p(Rft/R), which seems to be the most used heuristic. When the three nonsuperstitiously behaving subjects were taken out of the Yoked group, the correlation between judgment of control and percentage of superstitious responses went up to .87, $p < .001$ (note that r was .86 for the Escape group). Results of this phase support a contiguity—or superstition—view and are contrary to learned helplessness accounts of uncontrollability.

Cognitive Test

Table 1 shows the average criterion trial, number of failures to solve, and response latency for the three groups on the anagram test task. Yoked subjects did not significantly differ from Control or Escape subjects in any of the dependent variables (all *ps* > .05), and Escape versus Control comparisons were also nonsignificant (*ps* > .05). Thus, no facilitation nor learned helplessness effects were observed. Behavior of Yoked subjects in the test phase was not affected by the uncontrollability manipulation because they did not detect it during training.

EXPERIMENT 2

Results of Experiment 1 indicated that conditions of uncontrollable reinforcement commonly used in the human research do not lead to learned helplessness, but to superstitious behavior and illusion of control. However, many previous experiments had suggested that learned helplessness takes place under those conditions. Because the main difference between Experiment 1 and previous research in learned helplessness with humans was the elimination of failure feedback, Experiment 2 replicated the conditions *used* by Hiroto and Seligman (1975), reintroducing their failure component in the "yoked" group. If failure feedback is critical for the development of the interference effect, the Yoked group in the present experiment—unlike the Yoked group in Experiment 1—should show impaired performance in the test phase compared to the Escape and Control groups, replicating previous results in the human learned helplessness literature.

Method

Subjects

Forty-two undergraduate students from Deusto University volunteered for the experiment. Subjects had no computer experience and none of them had participated in Experiment 1. No significant differences were found for BDI, state anxiety, and typing speed scores between the three groups prior to treatment (*ps* > .1).

Procedure

The details of the procedure are identical to those of Experiment 1 except for conditions regarding the failure feedback in the replication of

TABLE 2
Means and Standard Deviations for Training and Test Task Variables, by Group, for Experiment 2

Group	Training		Test		
	Judgment of control	Judgment of controllability	Trials to criterion	Failures to solve	Mean latency
Escape					
M	77.71	99.92	10.92	1.64	23.77
SD	14.06	.26	5.75	2.20	17.18
Yoked					
M	7.69	61.92	18.50	4.57	35.80
SD	11.11	36.82	3.20	3.10	16.96
Control					
M	–	–	13.14	2.42	30.09
SD	–	–	5.88	2.20	19.25

the Hiroto and Seligman's yoked group. The following instruction was added to the instructions given to this Yoked-with-failure group (from now on, "Yoked-F").

"You will receive feedback on how the tone terminated on each trial. If the word "correct" appears, it means that you terminated the tone. If "time out" is displayed, it means that you were not able to terminate the tone, but that it terminated automatically".

Time out was displayed after termination of each trial in the Yoked-F group. The other groups did not receive feedback.

Results and Discussion

Instrumental Treatment

Contrary to results from Experiment 1, no superstitious responses were recorded during training in this experiment (note that every single response was punished in the Yoked-F group by the time out feedback). Table 2 shows the mean judgments of control and controllability. Unlike the Yoked subjects in Experiment 1, the Yoked-F subjects in this experiment did not show illusion of control: the mean percentage of tones that they believed they were able to terminate was very low and differed significantly from the percentage judged by Escape subjects ($U = .0$; $p < .001$). Similarly, Yoked-F subjects judged the task as significantly less controllable than Escape subjects did ($U = 22.5$; $p < .001$), although they still thought that the task was more controllable than it actually was for them.

Cognitive Test

Results of the test phase were also different from Experiment 1. They are shown in Table 2. Performance of the Yoked-F group was now significantly impaired when compared to that of the Escape group in trials to criterion ($U = 31.5$; $p < .01$), number of failures to solve ($U = 38.0$; $p < .01$), and mean response latency ($U = 52.0$; $p < .05$) and when compared to the Control group in trials to criterion ($U = 43.5$; $p < .01$) and number of failures to solve ($U = 56.0$; $p < .05$). Comparisons between Escape and Control groups were nonsignificant ($ps > .1$).

Results of this phase replicate previous findings in the human learned helplessness literature but they cannot be taken as evidence for learned helplessness theory because the induction procedure confounds uncontrollability with failure feedback.

GENERAL DISCUSSION

The results of the present experiments suggest that inconsistent findings between the superstition and learned helplessness literature regarding the effects of uncontrollable reinforcement in humans can be attributed to the failure manipulation that is frequently added to the yoked condition in learned helplessness experiments.

Experiment 1 eliminated the failure component and tested for both learned helplessness and superstitious behavior as possible effects of uncontrollable reinforcement in humans. Its results suggest that conditions of uncontrollable reinforcement commonly used in the human research (i.e., yoked distribution of reinforcement with quick automatic offset of noise once the Escape subjects reach criterion, mild aversive stimulation, no punishment, relatively short number of trials), do not lead to learned helplessness, but can result in superstitious behavior and illusion of control. A high illusion of both control and controllability accompanied by the development of superstitious behavior during the treatment phase was found in the group of subjects exposed to yoked noise, which in turn did not show impaired performance during the test phase.

Experiment 2 reintroduced the typical failure feedback manipulation and replicated previous findings in human learned helplessness research, showing impaired performance in the cognitive test task in the Yoked group of subjects exposed to failure. These results, however, should not be taken as evidence supporting learned helplessness theory because subjects are always told that they failed to terminate the tone, and thus learned helplessness's most distinctive prediction (i.e., that contrary to contiguity theory, subjects will learn that they have no control over noise termination) is not tested. Alternative explanations such as experimentally induced failure (e.g., Buchwald *et al.*, 1978), egotism (Frankel & Snyder, 1978), or even extinction due to the continuous failure to get the desired event are more relevant to these results than learned helplessness theory.

Because Experiments 1 and 2 were identical with the exception of the failure feedback that was added to the Yoked-F condition of Experiment 2, a statistical comparison combining data from both experiments seems interesting. Results of this analysis support the idea that it is failure, rather than uncontrollability, that causes impaired performance in the test phase. The Yoked group that was not exposed to failure (Yoked, Expt 1), did not significantly differ from the pooled Escape or Control conditions in any of the dependent variables measured during the test phase (all *ps* $> .05$), but did differ significantly from the Yoked group exposed to failure feedback (Yoked-F, Expt 2), which scored significantly worse in trials to criterion ($U = 37$, $p < .01$) and number of failures to solve ($U = 48$; $p < .025$). The Yoked-F group was also significantly impaired when compared to the pooled Escape group in trials to criterion ($U = 69.5$; $p < .001$), number of failures to solve ($U = 66$; $p < .001$), and mean response latency ($U = 92$; $p < .01$) and when compared to the pooled Control group in trials to criterion ($U = 109$; $p < .01$) and number of failures to solve ($U = 113.5$; $p = .025$).

That it is failure, rather than uncontrollability, that usually leads to the impairment effect in humans receives additional support from careful analysis of the other typical helplessness induction task introduced by Hiroto and Seligman (1975) and replicated in most human experiments on helplessness. The "cognitive" training task used by Hiroto and Seligman (1975) includes several discrimination problems in which subjects are instructed to learn a given pattern. Subjects in the "helpless" group receive random reinforcement in 50% of the trials and failure feedback at the end of each problem (i.e., they are told that their final answers are all incorrect). If we eliminate the failure component, this cognitive training task becomes a concurrent VR-2 schedule in which several responses are being reinforced with the same probability of .5. It does not matter whether it is response-1 or response-2, but there must be a response for a reward to occur, i.e., $p(Rft/R_j) = p(Rft/R_k)$ but $p(Rft/R_i) > p(Rft/\text{no } R_i)$. Learned helplessness theory does not predict any deficits after exposure to controllable (i.e., $p(Rft/R) \neq p(Rft/\text{no } R)$) situations (Seligman, 1975). Deficits that may be obtained in this task, under some conditions, in the absence of failure feedback (Kofta & Sedek, 1989, but see also Snyder & Frankel, 1989 for critique), are not mediated by the learning of response–outcome independence and have been explained in terms of the confusing experience to which subjects are exposed (Sedek & Kofta, 1990).

On the other hand, experiments in the instrumental uncontrollability tradition, and previous to the introduction of failure feedback, are relevant to the demonstration of learned helplessness in humans, but again, no support for the theory has been found in the literature. For instance, one of the few experiments conducted prior to the introduction of failure feedback was reported by Hiroto (1974), but the lack of a yoked procedure made his results questionable. Escape subjects received an average of 1.4 s of noise whereas helpless subjects received the whole amount of 5 s of noise per trial and were not exposed to reinforcement—whether controllable or not.

Another experiment conducted prior to 1975 and frequently cited as supporting learned helplessness theory was conducted by Thornton and Jacobs (1971). However, their yoked subjects did not differ significantly from control subjects in the test phase. Only subjects exposed to avoidable shock during the treatment phase differed significantly from both yoked and control subjects in the test task, showing a facilitation effect.

An additional experiment with no failure feedback was conducted in the cognitive treatment tradition by Roth and Kubal (1975). They did not observe deficits in a group of subjects exposed to random reinforcement in 50% of the trials. They only reported impaired performance in a group of subjects who "attempted two additional tasks [where the problems were] *supposedly decreasing in difficulty* [and the task was presented as] a good predictor of academic success in college" (pp. 682–683; italics added). Roth and Kubal interpreted this result as being caused by an extended exposure to uncontrollability in an important task. However, their task was not uncontrollable (i.e., $p(Rft/R) = .5$; $p(Rft/\text{no } R) = 0$), and an interpretation in terms of failure cannot be discarded. Making the subjects believe that the latest tasks were easier, while they kept receiving the same amount of reinforcement (only 50%), may have been interpreted by the subjects as a failure to get the higher degree of reinforcement that should be expected in the easier tasks.

In general, the present and previous results suggest that there is much more evidence for superstition and illusion of control than for learned helplessness in humans exposed to noncontingent reinforcement. It seems that if reinforcement occurs when subjects are trying to obtain it, they cannot learn that it would have occurred with the same probability if they had not responded. This raises serious doubts about the possibility of demonstrating learned helplessness in humans under similar conditions because perception of uncontrollability is a necessary step in learned helplessness (e.g., Abramson *et al.,* 1978; Maier & Seligman, 1976) and if subjects do not detect it, further steps in the etiological chain leading to helplessness symptoms cannot take place (see also Schwartz 1981a, 1981b).

Recent formulations of the learned helplessness effect in animals have focused on the modulatory role of the differential exposure to anxiety and fear in the controllable and uncontrollable shock conditions (Minor, 1990; Minor, Dess, & Overmier, 1991; Overmier, 1988). This view would not predict deficits for human research either because of the mild aversive stimulation that it uses. Unfortunately, this account is untestable with human subjects because ethical constraints would apply if we were to use more powerful aversive stimulation with humans.

All this may mean that learned helplessness cannot be obtained in human research. But learned helplessness theory has not been adequately tested in human subjects and much research needs to be done without the failure manipulation in order to test for learned helplessness versus superstition and illusion of control under different conditions of response–outcome independence. A plausible alternative to the all-or-none approach is that learned helplessness and superstition represent opposite ends of the same continuum, and if this were true, each of both effects should be more frequent under some conditions than others. The present results call for the specification of conditions that may lead to learned helplessness or to superstitious behavior as possible—and opposite—effects of the exposure to uncontrollable outcomes.

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