LEARNED HELPLESSNESS: THE RESULT OF THE UNCONTROLLABILITY OF REINFORCEMENT OR THE RESULT OF THE UNCONTROLLABILITY OF AVERSIVE STIMULI?

THESIS

Presented to the Graduate Council of the North Texas State University in Partial Fulfillment of the Requirements For the Degree of

MASTER OF ARTS

by

James S. Benson
Denton, Texas
August, 1975
Abstract

Benson, James S., *Learned Helplessness: The Result of the Uncontrollability of Reinforcement or the Result of the Uncontrollability of Aversive Stimuli?* Masters Degree in Experimental Psychology, August, 1975, 38 pages, one table, four illustrations, 14 titles.

This research demonstrates that experience with uncontrollable reinforcement, here defined as continuous non-contingent positive feedback to solution attempts of insoluble problems, fails to produce the proactive interference phenomenon, learned helplessness, while uncontrollable aversive events, here defined as negative feedback to solution attempts of insoluble problems, produces that phenomenon. These results partially support the "learned helplessness" hypothesis of Seligman (1975) which predicts that experience with uncontrollable reinforcement, the offset of negative events or the onset of positive ones, results in learning that responding is independent of reinforcement and that learning transfers to subsequent situations. This research further demonstrates that experience with controllability, here defined as solubility, results in enhanced competence.
<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Means and Standard Deviations for the four measures</td>
<td>22</td>
</tr>
</tbody>
</table>
## LIST OF ILLUSTRATIONS

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>A sample trial from an eight value Levine type discrimination problem</td>
<td>8</td>
</tr>
<tr>
<td>2.</td>
<td>Means and Standard Deviations for the Trials to Criterion Measure</td>
<td>21</td>
</tr>
<tr>
<td>3.</td>
<td>Means and Standard Deviations for the Latency Measure</td>
<td>23</td>
</tr>
<tr>
<td>4.</td>
<td>Means and Standard Deviations for the Failures to Solve Measure</td>
<td>24</td>
</tr>
</tbody>
</table>
Learned Helplessness: The Result of the Uncontrollability of Reinforcement or the Result of the Uncontrollability of Aversive Stimuli?

The development of M. E. P. Seligman's cognitive theory of learned helplessness began when Overmier and Seligman (1967) demonstrated an escape interference phenomenon in dogs which had been exposed to inescapable shock prior to escape-avoidance trials in a two-way shuttle-box. Failure to escape shock in the shuttle-box was an infrequent occurrence in a group which did not receive inescapable shock, but it was commonplace in groups which had been exposed to the inescapable shock. The interference phenomenon did not seem to be dependent upon the specific shock exposure parameters, but seemed to be a general phenomenon resulting from exposure to inescapable shock. It was also observed that the occurrence of an escape response reliably predicted additional such responses for dogs not previously exposed to inescapable shock while dogs previously exposed to inescapable shock seemed to fail to learn the contingencies even after making one or more escape responses. It was concluded by the experimenters that this interference phenomenon resulted from a learned "helplessness" which occurred when an animal received aversive stimuli in a situation in which no response of his own was effective in controlling the trauma.
In later experiments Seligman and Maier (1967) and Maier (1970) further related this interference phenomenon to the degree of control the animals had over the termination of shock. It was shown that if shock is terminated independently of the animal's responses during its initial experience with shock, interference with subsequent escape-avoidance responding would occur. If, however, during his initial experience with shock, the shock is terminated by a response of his own, the animal would evidence no interference effect. This suggested that it was not shock itself which was related to the interference phenomenon, but lack of control over the termination of shock. It was concluded that differential learning about their control over shock occurred in groups which could control the offset of shock and those which could not. Animals which could not control shock learned that no response of their own was correlated with shock offset; that the probability of shock termination in the presence of any given response was the same as the probability of shock termination in the absence of response.

It was further suggested that since the incentive for response might be an expectancy that response would lead to termination of shock, there was inadequate motivation for appropriate escape-avoidance responding in groups which could not control the offset of shock. Shock did not produce the interference effect in the dogs which could control the offset of shock because they learned that shock termina-
tion was correlated with their responding.

Since it had been shown that it was not shock itself which induced learned helplessness, but the lack of control over the termination of shock and since termination of aversive stimuli could be equated with reinforcement, the experimenters were led to the conclusion that learned helplessness resulted from the uncontrollability of reinforcement. Seligman and Maier (1967) proposed that the concept of learned helplessness included not only uncontrollable aversive events, but uncontrollable positive reinforcement as well. It was suggested that "Learning that one's own responding and reinforcement are independent might be expected to play a role in appetitive situations. Further, might learned 'helplessness' transfer from aversive to appetitive situations or vice versa?" (Seligman & Maier, 1967, p.8)

Since these experiments with dogs this proactive interference phenomenon, learned helplessness, has been exhibited in rats, cats, fish, mice, monkeys and men (Seligman, 1974, 1975). Hiroto (1974) found that the response rate of human subjects who had been subjected to an uncontrollable aversive tone was depressed in a subsequent situation which called for another response to escape-avoid the tone. Hiroto and Seligman (1975) also found that this interference phenomenon in man not only occurs in a test situation similar to the situation in which the phenomenon was introduced, but that it generalizes from an instrumental situation to a cognitive
task and from a cognitive situation to an instrumental task. Individuals who had been exposed to insoluble discrimination problems were retarded both in the subsequent solution of other soluble cognitive problems of a different type and in instrumental escape-avoidance behavior. Individuals who had been exposed to inescapable aversive tone were retarded in the subsequent solution of soluble cognitive tasks as well as in subsequent instrumental escape-avoidance of the aversive tone.

These studies have related learned helplessness to lack of control over aversive events. Yet, the learned helplessness hypothesis as proposed by Seligman asserts that it is not aversive outcomes which produce learned helplessness, but lack of control over reinforcement. Seligman (1975) contends that learned helplessness results when one learns that reinforcement is independent of his own responding, that the probability of reinforcement is the same in the presence of a response or the absence of that response. If the probability of reinforcement given a response is different from the probability of reinforcement in the absence of that response, one controls the reinforcement; if the probability is the same, one does not control the reinforcement. Seligman's hypothesis is based on the assumption that organisms are sensitive to the non-correlation of response and outcome as well as to the correlation of response and outcome. This hypothesis predicts that when one is
faced with a situation in which the outcome is independent of his response, he will learn that independence and develop an expectancy that future outcomes will be independent of his responding. The hypothesis then predicts that such learning will produce an individual who acts in accordance with that learning. Since he believes his responses do not control outcomes, he will be slow to initiate responses to control outcomes and he will be slow to learn response-outcome contingencies.

This hypothesis does not specify the uncontrollability of aversive stimuli, but the uncontrollability of reinforcement. However, studies to date have investigated learned helplessness only in relation to the uncontrollability of aversive stimuli. In spite of Seligman's claim "... that not only trauma occurring independently of response, but non-contingent positive events, can produce helplessness" (Seligman, 1975, p. 98), no test has been made of the effects of the uncontrollability of reinforcement, when reinforcement was not equated with the termination of aversive stimuli. The main purpose of this study is to test that hypothesis. Will uncontrollable non-contingent positive events produce learned helplessness?

In the search for an experimental situation which would test this hypothesis the methodology of Hiroto and Seligman (1975) served as a guide. In that study it was assumed that insolubility in a cognitive task is formally analogous to
inescapability, since in both the probability of reinforcement ("correct" or "incorrect," or shock or no shock) is independent of responding and is equal in either case. These experimenters found that those pretreated by exposure to insoluble Levine (1971) type discrimination problems, random "correct" and "incorrect" feedback during solution attempts, and negative feedback upon their statement of their final solution for each problem performed worse on a subsequent anagram test task than control subjects and those who had been exposed to soluble Levine type discrimination problems. In other words those who failed in one learning task had trouble with a subsequent but different cognitive task. This cannot, however, be considered an adequate test of the hypothesis of the present study because failure is aversive and statements like "incorrect" and "that's the wrong answer" are aversive in themselves.

Figure 1 represents a single trial of a ten trial, eight value Levine (1971) type discrimination problem. The values are: solid border, dashed border, large letter, small letter, the letter "X," the letter "T," red letter, black letter. The problem is to choose the correct value from experimenter feedback regarding the correctness of the right or left side of the pattern.

For the present study four groups were compared on an
Figure 1. A sample trial from an eight value Levine type discrimination problem. (In the actual problem the letter X is in red.)

anagram test task similar to that used in the Hiroto and Seligman (1975) study. Two of the groups were very similar to two of those of the former study. (1) a soluble problem group was pretreated with five soluble Levine (1971) type discrimination problems similar to those used in the former study. Each participant received response-contingent "correct" and "incorrect" feedback during solution attempts and at the end of each problem he received response-contingent feedback to his statement of what he thought was the correct value; (2) an insoluble-aversive group was pre-treated with five insoluble Levine type problems similar to
those used in the former study. Each participant received random "correct" and "incorrect" feedback like that used in the former study during solution attempts and at the end of each problem he received negative feedback upon his statement of what he thought was the correct value; (3) the control group was slightly different from that of the former study. In that study the control group was exposed to the stimulus patterns used to make up the soluble and insoluble problems used as pretreatment for the other groups. In order to make the present study more nearly parallel to the early animal studies which used naive animals as control subjects, the control group received no pretreatment in the present study; (4) a completely new group was added to answer the experimental question. This group received uncontrollable reinforcement which was here defined as non-contingent positive feedback to insoluble problem solution attempts. This always "correct" group was pretreated with the same five insoluble problems which were used for the insoluble-aversive group except that instead of the feedback used for that group, members of this group received non-contingent "correct" feedback during solution attempts and at the end of each problem each participant received non-contingent positive feedback upon his statement of what he thought was the correct value. This feedback can in no way be considered aversive, but it was expected to generate a situation in which responding and outcome were independent,
a situation over which an individual could exercise no control and which would create the perception of uncontrollability.

There are some additional problems which were considered in the development of this study. There are two problems connected with the difference among individuals prior to the experimental treatment. The first is the difference among individuals in their ability to solve Levine type discrimination problems. Some individuals have a great deal of difficulty with Levine type problems. They don't solve them. If an individual is assigned to the soluble problem group, then is unable to solve all the problems, can it be concluded that he will respond later as if the problems to which he was exposed were soluble? Levine (1971) answers this question with an emphatic, "no."

He concludes that an individual who does not solve a problem will behave in a manner similar to that of an individual exposed to an insoluble problem. If this is an accurate position and if insolubility will produce learned helplessness, won't an unsolved problem produce helplessness? If the answer to this question is "yes," the anagram solution rate of the soluble problem group will be considerably depressed by individuals who are exhibiting "helplessness." This will tend to reduce any differences in groups due to treatment effects since part of the soluble problem group
received the same treatment, insolubility, as the individuals in the insoluble problem group. It will, therefore, make any difference in treatment effect difficult to detect.

To solve this problem Hiroto and Seligman (1975) eliminated any individuals from the soluble problem group who were not able to solve all of the Levine type discrimination problems. While this would seem to solve this problem, it would appear to be experimentally unsound in an independent groups design. If subjects for a soluble group were selected for their cognitive ability by the selection of only those with the ability to solve all of the Levine type discrimination problems while subjects for the insoluble group are accepted without regard to their cognitive ability, the results of a comparison of these groups on a subsequent cognitive task might be confounded by a systematic difference in cognitive ability. In the present study no such solution was attempted, but it was planned that the number of individuals in each group would be large enough so that the helplessness of the insoluble problem group could be detected, even though the performance of the soluble problem group were depressed by the performance of an occasional subject unable to solve the soluble problems.

The second problem connected with pretreatment differences in individuals is the degree of susceptibility to helplessness induction. One of the reasons for the beginnings of helplessness research was the observation that all naive
dogs did not learn to escape in the shuttle-box escape-avoidance situation (Overmier & Seligman, 1967). For some animals exposure to the shuttle-box situation seemed to be enough to produce the passivity connected with learned helplessness. It was also shown in the early experiments of Overmier and Seligman (1967) that all animals do not become helpless when exposed to repeated inescapable shock. In this connection, Hiroto (1974) noted that only a percentage of those human subjects exposed to inescapable noise failed to escape noise in the shuttle-box trials. Miller (Note 1) has shown that depressed individuals behave in the same manner as those in which helplessness has been induced and that the greater the depression, the greater the helpless behavior. Nothing will be done in the present study to eliminate depressed subjects.

Because these individual differences might make treatment effects difficult to detect, it was planned that the number of individuals in each group be large enough that any reasonably strong treatment effects could be detected.

In this study, as in the Hiroto and Seligman (1975) study, three dependent measures were used to assess helplessness. These measures were: (1) Mean trials to criterion, with criterion being defined as the solution of three consecutive anagram problems in less than 15 seconds, after which no failure to solve occurs. When this criterion is reached it will indicate that the subject has caught
on to the pattern of letters for the anagrams. (2) Mean response latency for the 20 anagrams. (3) Mean number of failures to solve with failure to solve being defined as a solution time equal to 100 seconds.

The learned helplessness hypothesis of Seligman predicts that both the insoluble-aversive group and the always "correct" feedback group will perform worse on one or more of the three measures than both the group pretreated with soluble problems and the control group.

**Method**

**Subjects**

Thirty-eight male and sixty-four female undergraduate psychology students at North Texas State University were obtained through the Psychology Department subject pool which is composed of students in freshman and sophomore psychology courses who volunteer to participate in research for extra course credit. During the experiment one subject was excused because she had inadequate knowledge of the language. She was foreign-born and educated. She had had but a single year of the study of the English language in a non-English speaking country and had been in the United States for only three months. She was totally unfamiliar with some of the words used to make the anagrams for the test task. Another subject was excused because the experimenter inadvertently placed a data sheet which contained a list of the anagrams on the test task in front of
her. These subjects were replaced with the next participants to appear in the laboratory. Final analysis was made on data from 100 subjects.

Apparatus

Pretreatment. Both the soluble and insoluble problems were composed of a series of four-dimensional stimulus patterns similar to those used by Hiroto and Seligman (1975) and in previous discrimination learning studies (Levine, 1971). Figure 1 presents an example of a stimulus pattern. Each of four dimensions had two values: (a) border, 1) solid, 2) dashed; (b) letter size, 1) large, 2) small; (c) letter, 1) "X," 2) "T," (d) letter color, 1) red, 2) black. Each problem was made up of ten such patterns presented one at a time on 20.2 X 12.7 cm white index cards contained in a three ring binder. A soluble problem was one which had one value of one of the dimensions, for example, large letter, consistently correct for the ten pattern problem. An insoluble problem had no consistently correct value. Any value was correct for an always "correct" problem.

Test Task. The test task for all individuals was the same, a series of 20 five letter anagrams similar to those used by Hiroto and Seligman (1975). Examples are:
(a) B L O E N; (b) R N U T B; (c) B O A R L. The letter order for all anagrams was the same, 3-4-2-5-1. When this pattern was discovered, solution of the remaining anagrams
was rapid. These anagrams, composed of .48 cm letters were presented one at a time on 20.2 X 12.7 cm white index cards which were contained in a three ring binder.

For both the pretreatment and test task portions of the experiment each research participant was seated at a table on which there was only the binder containing the problems to be presented. Immediately behind the table was a screen which hid the experimenter from the view of the participant, but which did not prevent the experimenter seeing the participant or voice communication between the experimenter and the participant. Instructions for both tasks were given by means of an Ampex cassette tape recorder. A stop watch was used to time the responses of the participants.

Procedure

A table of random numbers was used for random assignment of research participants to one of four groups. The groups were then randomly assigned to the conditions. Research participants were assigned to groups and conditions on the basis of their order of appearance in the laboratory. the four conditions were: (a) Soluble, in which each participant was presented with five soluble discrimination problems together with contingent "correct" or "incorrect" feedback; (b) Insoluble-aversive, in which each participant was presented with five insoluble discrimination problems together with random "correct"/"incorrect" feedback, and
at the end of each problem when he stated the value he thought was correct, the feedback given was, "that's the wrong answer;" (c) Always "correct," in which the participant was presented with the same five insoluble problems but was given non-contingent always "correct" feedback and was told, "that's the right answer," in response to any value he selected at the end of each problem; (d) Control, in which the participants received no pretreatment. Each participant in the first three conditions received the anagram test task immediately after completion of the pretreatment phase. Each participant in the control group received it upon entering.

After the participant was comfortably seated for the pretreatment phase of the experiment, the tape recorder was switched on so that the participant heard the following instructions which were patterned after and were as nearly as possible the same as those used by Hiroto and Seligman (1975):

In this experiment it will be necessary for you to turn the cards in the book in front of you one at a time. Turn the first one please. In this experiment you will be looking at cards like the one now in front of you. Each card has two stimulus patterns on it. The patterns are composed of five different dimensions and there are two values associated with each dimension. The dimensions are: Border, Letter size, Letter,
Letter color, and Underline. The values associated with the dimensions are as follows: The two values associated with the circular border are solid or dashed. In other words the circle may be either solid or dashed. The two values associated with letter size are large or small. The two letter values are "T" or "X." The two color values are black or red. The two values associated with the underline are dashed or solid. Each stimulus pattern has one value from each of the five dimensions. I have arbitrarily chosen one of the ten values as being correct. For each card I want you to choose which side, right or left, contains this value, and I will then tell you if your choice was correct or incorrect. In a few trials you can learn what the correct value is by this feedback. The object for you is to figure out what the answer is. When the trials are completed I will ask you which value you chose. So that you may become familiar with this type of problem, the first five trials are sample trials. After you have said which side, left or right, for the first card, turn to the next card and continue.

After the five trials of the sample problem were completed and choosing the correct value was clarified, the participant was asked if he had any questions. After his questions were answered, he was asked to proceed with the
first problem. For all groups, when ten seconds had elapsed after which a participant had begun to look at a stimulus card, he was informed that he had five seconds to make a decision, so that the maximum amount of time for a decision on any one pattern was 15 seconds. In the soluble problem group, as each participant responded with the side he concluded contained the "correct" value, he was given contingent feedback of "correct" or "incorrect" by the experimenter. At the end of each problem the subject was asked, "what value did you choose?" Upon answer he was told if he was "correct" or "incorrect." As each participant in the insoluble-aversive group responded with the side he concluded contained the "correct" value, he was given the following randomized "correct" (C) and "incorrect" (I) feedback which was copied from the study of Hiroto and Seligman (1975): For the ten trials of problem 1) C-I-I-C-I-C-I-I-C-I; problem 2) I-C-I-C-I-C-I-C-I-C-I; 3) I-C-I-C-I-C-I-C-I-C-I; 4) C-I-I-C-I-I-C-I-C-I; 5) I-C-I-C-I-C-I-C-I-C-I. At the end of each problem when the participant made a statement of the value he had chosen, he was told, "that's the wrong answer," As each participant in the always "correct" feedback group responded with the side he had chosen as containing the correct value, he was always told, "correct." To his statement of value at the end of each problem, he was told, "that's the right answer."

The participants in the control group were not exposed
to the stimulus pattern cards of the pretreatment phase, but were introduced to the test task only. The instructions for the test task were the same for all groups. Immediately after the completion of the first phase of the experiment, the binders were changed so that the participant was seated at the same table with the binder containing the anagrams, described earlier, on the table in front of him. The tape recorder was switched on so the participant heard the following instructions which were taken verbatim from the Hiroto and Seligman (1975) study:

You will now be asked to solve some anagrams. As you know anagrams are words with the letters scrambled. The problem for you is to unscramble the letters so that they make a word. When you think you've found the word tell me what it is and I'll tell you if you are right or wrong. The anagrams are found in the book in front of you. Now, there may be a pattern or principle by which you can solve the anagrams, but that is up to you to figure out. Please do not turn any card until you are told to do so. I can't answer any questions now. After the experiment is over I'll answer all questions. (Hiroto & Seligman, 1975, p.319)

Time began for each anagram problem when the participant was told to turn the card. The solution time for each anagram was timed with a stop watch and recorded after each of the problems and before the participant was told to turn
the next card. If the solution of any anagram was not complete within 90 seconds, the participant was informed that he had ten seconds within which to make a word. If the problem was not solved within 100 seconds, the solution time was recorded as 100 seconds and the subject was asked to turn to the next card.

After the completion of the anagram phase, the participant was asked to indicate his feelings during the first phase of the experiment by answering the following five choice question:

My progress on the discrimination problems was mainly due to (1) the difficulty of the problems; (2) the ease of the problems; (3) luck; (4) skill; (5) experimenter control.

The research participant was then debriefed and dismissed.

Results

As predicted by the learned helplessness hypothesis the interference phenomenon was produced in the insoluble-aversive group, but contrary to the prediction of the learned helplessness hypothesis, the phenomenon was not produced in the always "correct" feedback group. The means and standard deviations for the trials to criterion for finding the pattern for anagram solution are presented in Figure 2 and appear in Table 1.

Those in the soluble problem group learned the letter pattern for anagram solution more readily than those in any
of the other groups; only six of those subjects failed to learn the pattern. Those in the insoluble-aversive group learned it less readily than those in any of the other groups; nineteen of this group failed to learn the pattern. Those in the always "correct" feedback group learned it no more or less readily than those in the control group.

Analysis of variance indicated a significant difference,
TABLE 1
MEANS AND STANDARD DEVIATIONS FOR THE FOUR MEASURES

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>INSOLUBLE</th>
<th>&quot;CORRECT&quot;</th>
<th>SOLUBLE</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATTRIBUTION X</td>
<td>1.80</td>
<td>1.90</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>.65</td>
<td>.28</td>
<td>.51</td>
<td></td>
</tr>
<tr>
<td>FAILURES TO SOLVE X</td>
<td>4.20</td>
<td>4.80</td>
<td>3.30</td>
<td>5.40</td>
</tr>
<tr>
<td>SD</td>
<td>2.50</td>
<td>4.30</td>
<td>2.90</td>
<td>4.06</td>
</tr>
<tr>
<td>LATENCY X</td>
<td>39.59</td>
<td>36.87</td>
<td>28.08</td>
<td>42.62</td>
</tr>
<tr>
<td>SD</td>
<td>14.09</td>
<td>23.08</td>
<td>18.14</td>
<td>21.68</td>
</tr>
<tr>
<td>TRIALS TO CRITERION X</td>
<td>18.60</td>
<td>15.60</td>
<td>11.88</td>
<td>16.68</td>
</tr>
<tr>
<td>SD</td>
<td>3.42</td>
<td>5.78</td>
<td>6.99</td>
<td>5.78</td>
</tr>
</tbody>
</table>

F (3,96) = 6.28, p < .01. Individual comparison of pairs of means by the Newman-Keuls method (Winer, 1971) indicated that all pairs of means except the pair, always "correct" and control, are significantly different, all p's < .05.

The means and standard deviations for the latency and failures to solve measures are presented in Figures 3 and 4 respectively. These statistics also appear in Table 1. Analysis of variance indicated that there were no significant
differences in the mean performances of the groups on either the latency measure or the failures to solve measure. For the latency measure, $F(3, 96) = 2.56, p > .05$. For the failures to solve measure, $F(3, 96) = 1.66, p > .05$.

As expected the perception of uncontrollability was produced in the always "correct" feedback condition as well as in the insoluble-aversive condition. This was verified by analysis of scores on the attributional measure administered after completion of the test task phase of the experi-
Figure 4. Means and Standard Deviations for the Failures to Solve Measure.

Answer 4 on the measure, "my progress on the discrimination problems was mainly due to skill," indicated the perception of controllability and was assigned the value of 1. Answers 1, 2, 3, and 5, "my progress on the discrimination problems was mainly due to the difficulty of the problems," "... the ease of the problems," "... luck," "... experimenter control," respectively indicated the perception of uncontrollability and were assigned the value of 2. The means and standard deviations for the groups based
on this scoring appear in Table 1. The insoluble-aversive and always "correct" feedback groups were not different in their perception of uncontrollability of outcome, while the soluble problem group perceived control over the outcome. Analysis of variance indicated a significant difference in the mean response, $F (2,72) = 117.16, p < .01$. An individual comparison of pairs of means by the Newman-Keuls method (Winer, 1971) indicated that there was no significant difference in the insoluble-aversive and always "correct" groups. These were both significantly different from the soluble problem group, $p < .01$. A chi square was computed using the actual responses on the question in order to determine if there was a significant difference in the patterns of responses between the insoluble-aversive and the always "correct" groups, $X^2 (3) = 6.25, p > .10$.

As expected every subject in the soluble problem group did not solve all five pretreatment discrimination problems. Ten of the subjects solved all five problems; eleven subjects solved four each; three subjects solved three problems each; one subject solved only two problems. These differences, however, did not bring about the anticipated difference in performance for those who solved all and those who solved only part of the pretreatment problems. The means on the trials to criterion measure for anagram solution for those who had solved all and those who had solved only part of the problems were 10.6 and 12.73 respectively. A $t$-test
indicated that there was no significant difference in these means, $t(23) = 1.61, p > .05$.

Discussion

The results of this study partially support the learned helplessness hypothesis. The learned helplessness hypothesis predicts that those who were pretreated with insoluble problems and who received aversive feedback during solution attempts would learn subsequent contingencies less rapidly than those pretreated with soluble problems and who received response-contingent feedback during solution attempts and those in a control group who received no pretreatment. The results of this study support the prediction. The insoluble-aversive group was slower in learning the pattern for anagram solution than both the control group and the soluble problem group.

This finding is in agreement with the findings of prior research with human subjects and again demonstrates that learned helplessness in man is parallel to learned helplessness in animals. In their early experiments with animals Seligman and Maier (1967) found that even though dogs which had been exposed to inescapable shock escaped occasionally in the shuttle-box, this did not predict future escape responses, while the escape of naive animals and animals pretreated with escapable shock reliably predicted future escape and avoidance learning. The inescapable shock animals did not learn in spite of the perfect correlation between
response and outcome. Hiroto (1974) found that human sub-
jects also fail to learn to escape or avoid an aversive
tone after being subjected to an inescapable aversive tone
in spite of the perfect correlation between response and
outcome while naive subjects and those who had been exposed
to an escapable aversive tone tended to learn to escape and
avoid the subsequent tone. Hiroto and Seligman (1975)
found that human subjects exposed to an insoluble cognitive
task which involved random "correct" and "incorrect" feed-
back during solution attempts and negative feedback upon
statement of value selection behaved on subsequent instru-
mental and cognitive tasks in a manner similar to those
within whom helplessness had been induced by inescapable
aversive tone. The results of the present study lend
support to these studies. Here learned helplessness in man
is again demonstrated and it is strongly indicated that
cognitive functioning is inhibited in a similar manner to
instrumental learning by the uncontrollability of negative
outcomes. Here, as in the study of Hiroto and Seligman
(1975), when those in the insoluble-aversive condition
solved anagrams it did not predict future solution through
knowing the pattern. However, solution of a few anagrams
by those in the soluble group predicted future solution
through knowing the pattern.

In addition to replicating the findings of the study of
Hiroto and Seligman (1975), learned helplessness of cognitive
functioning was produced without a major methodological problem of that study. No subjects were eliminated from the soluble group for their failure to solve all of the problems. As a result it was found that subjects need not solve all of the pretreatment problems in order to avoid helplessness induction. Solution of only part of the problems seems to be adequate insulation against learned helplessness. Failure on part of the problems does not produce a helpless subject, but one who perceives he has control over the outcome and is as competent as one who has solved all of the problems.

Further, the results of the present study may help to clarify the nature of learned helplessness. The main purpose of this study was to determine if uncontrollability of reinforcement, when that reinforcement is not defined as the termination of aversive stimuli, is sufficient to produce learned helplessness. The results indicate that it is not. These results are in fact evidence to the contrary. Analysis of the post test questionnaire indicates the subjects in the always "correct" group perceived uncontrollability of outcome as much as did those in the insoluble-aversive group, yet they were very much like the control group in learning the pattern for anagram solution and exhibited no helplessness when compared to that group. The pretreatment problems for this group were no more soluble than those of the insoluble-aversive group and this group perceived that fact, but the subjects did not become helpless as did those in the
insoluble-aversive group. This seems to indicate that it was not the insolubility, the perception of uncontrollability of outcome as such, which induced helplessness, but the perception of uncontrollability of aversive feedback connected with the insolubility. Here, when the stimuli associated with the uncontrollability were not aversive, helplessness did not result. Perceived uncontrollability of reinforcement did not result in helplessness, while perceived uncontrollability of aversive stimuli did produce the phenomenon.

Another finding of this study is that experience with soluble problems not only did not produce helplessness, but facilitated learning in the subsequent anagram solution task. Those subjects in the soluble group not only learned faster than those in both insoluble groups, but also learned faster than those in the control group. This appears to indicate that experience with controllability of negative outcomes leads to enhanced competence. Even those who did not solve all, but only part of the pretreatment problems were more competent than the insoluble-aversive, always "correct" and control subjects. One or two failures in the five problem series did not make the subject perceive uncontrollability of negative outcome. If a subject failed on one problem and succeeded on the next, he appeared to perceive control over the outcome.

These conclusions were reached on the basis of the
significant results on the trials to criterion measure. It was predicted that a significant difference in performance among the groups would be detected by one or more of the measures used, but it was expected that not all of the measures would be sensitive to the phenomenon. This expectancy was present as a consequence of the results of the study which served as a guide for this one, the Hiroto and Seligman (1975) study, which included the same measures. In that study all of the measures were not sensitive to the phenomenon. Analysis of the data from the original experiment of that study, which involved the presentation of three discrimination problems, found no significant differences in cognitive-cognitive transfer among the groups on any of the three measures. Therefore, these experimenters repeated their procedure with four insoluble Levine type discrimination problems instead of three. This repeated procedure produced significant differences among the groups on the trials to criterion measure and the failure to solve measure, but none on the latency measure. In spite of the fact that the treatment for the present study was increased from four to five insoluble problems, the results of the former study led us to the belief that all of the measures would not be sensitive to the learned helplessness phenomenon.

When comparing the results of the two studies on the trials to criterion measure, the difference between the control group and the insoluble-aversive group of the
present study was very much like that of the former study. However, the former results did not show the enhanced performance of the soluble problem group over the control group as did the present study. Of the three measures, the trials to criterion measure is the one which should be the best measure of one of the most consistent observations in the learned helplessness literature, slower learning or insensitivity to response-outcome contingencies by helpless organisms. Therefore, this measure is probably the most appropriate one of the three for a study of cognitive learned helplessness.

In summary, the findings of this study are, 1) uncontrollability of aversive stimuli, in this case, insolubility coupled with aversive feedback, inhibits the learning of contingencies in subsequent situations, in this case the letter pattern for the solution of the anagrams; 2) uncontrollability of reinforcement, in this case, continuous non-contingent positive feedback, does nothing either to facilitate or inhibit learning of contingencies in subsequent situations; 3) controllability of aversive stimuli, in this case, solubility coupled with response-contingent feedback, facilitates the learning of contingencies in subsequent situations, in this case, the anagram solution pattern.

These results are related to the findings of Yates, Kennelly, and Cox (1975). In a study equating the determinants of learned helplessness had locus of control they found
that childhood perception of contingent parental punishment, control over negative outcome, was predictive of an internal locus of control and childhood perception of non-contingent parental punishment, uncontrollability of negative outcome, was predictive of an external locus of control, but that childhood perception of contingency or noncontingency of parental reward, was not significantly related to locus of control. In other words, the determinant of locus of control may well be the degree of controllability or uncontrollability of aversive stimuli, not the degree of controllability of reinforcement. Since locus of control and learned helplessness are analogous concepts (Hiroto, 1974), it might be concluded from these findings that the determinant of learned helplessness is the degree of uncontrollability of aversive stimuli rather than the degree of uncontrollability of reinforcement. Conversely, the perception of contingent punishment, experience with control over aversive stimuli, leads to increased competence.

In another study which is confirming of this conclusion, Kennelly and Kinley (1975) found that for sixth grade boys the perception of teachers as contingently punitive was positively related to an internal locus of control and academic achievement, but perceived contingency of teacher rewards was not related to either locus of control or academic achievement.

These results are also related to the findings of Dweck
(1975) in her study of attribution retraining of children who were failing in their schoolwork. She found that performance was increased in a group which experienced both successes and failures during treatment and who learned to attribute those failures to a lack of effort rather than a lack of ability; but there was no change in performance for a group which experienced success only during treatment. It was learning that they could control failure that alleviated the learned helplessness which these failing children exhibited prior to treatment. Simply learning that they could succeed, in the absence of learning that they could control failure, did not seem to have any effect on their helplessness.

The results of the present study when evaluated in the light of these related findings have considerable theoretical implication and indicate that the learned helplessness hypothesis is perhaps too broad. This hypothesis might have more explanatory power if it were more limited. It appears that learned helplessness involves a reaction to uncontrollable aversive stimuli, not simply the learning that outcome is independent of responding. Those in the always "correct" feedback group learned that outcome is independent of responding, but did not develop learned helplessness. Independence of response coupled with uncontrollable aversive stimuli produces learned helplessness. Subjects in the insoluble-aversive group learned not only that their
responding was independent of outcome, but that that outcome was one connected with aversive stimuli. Therefore, when one learns that an outcome is independent of his own responding, he may tend to diminish the initiation of responding to control that outcome through lack of motivation, but this does not seem to interfere with responding to control subsequent outcomes or the learning of subsequent contingencies unless the outcome in the first situation is a negative one or one connected with aversive stimuli.

The results obtained in this study immediately suggest the investigation of the remaining possible explanations for the appearance of the learned helplessness phenomenon in a cognitive situation. Prior to this research the possible explanations were 1) the uncontrollability of reinforcement which would be any uncontrollable feedback, positive or negative; 2) the uncontrollability of aversive stimuli only; 3) the uncontrollability of a combination of pleasant and aversive stimuli which would be a combination of positive and negative feedback as in the insoluble-aversive group. This study indicates that the uncontrollability of reinforcement does not produce the phenomenon, but we still must discover if only one of the other two possibilities is sufficient to produce helplessness or if it can be produced equally as well by both conditions.

Since the results of this study and the findings of related studies indicate that exposure to soluble problems
reverses learned helplessness, it is suggested that, in future experiments, subjects in helplessness inducing conditions be offered experience with soluble problems as a part of debriefing.
Reference Notes

References


