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AUTHOR Seybert, Jeffrey A.; And Others
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ABSTRACT

The effects of different schedules of noncontingent reward on subsequent learning in children were investigated. In the first phase of the experiment subjects performed a block-design matching task and received one of three schedules of noncontingent reward, i.e., continuous reward (Group CRF), random reward on 50% of the trials (Group 50R), or no reward (Group NRF) regardless of their response. Two additional control groups received either contingent reward when they correctly matched a design (Group CON) or no pretreatment prior to testing (Group NPT). In the second phase of the experiment all subjects performed a pencil maze completion task under identical schedules of contingent reward. The results from the second phase indicated that groups CRF, 50R and NRF exhibited equal performance which was poorer than that of groups CON and NPT. These results suggest that experience with noncontingent reward can produce response decrements in humans and that noncontingency, rather than any specific reinforcement schedule, is the critical factor in producing learned helplessness. (Author)

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Appetitive Learned Helplessness in Children

Jeffrey A. Seybert, Mark A. Wilson,
& G. Lynn Vandenberg
Univeristy of Missouri-Kansas City

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ABSTRACT

Experience with noncontingent aversive and appetitive reinforcement for animals and aversive reinforcement for humans has been shown to produce a response decrement that generalizes beyond the initial situation, a finding labeled "learned helplessness." However, a review of the relevant literature indicates that appetitive learned helplessness has not been demonstrated using human subjects. Accordingly, the present experiment investigated the effects of different schedules of noncontingent reward on subsequent learning in humans. In the first phase of the experiment subjects performed a block-design matching task and received one of three schedules of noncontingent reward: continuous reward (Group CRF), random reward on 50% of the trials (Group 50R) or no reward (Group NRF) regardless of their response. Two additional control groups received either contingent reward when they correctly matched a design (Group CON) or no pretreatment prior to testing (Group NPT).

In the second phase of the experiment all subjects performed a pencil maze completion task under identical schedules of contingent reward. The results from phase two indicated that groups CRF, 50R and NRF exhibited equal performance which was poorer that that of groups CON and NPT. These results suggest that experience with noncontingent reward can produce response decrements in humans and that noncontingency, rather than any specific reinforcement schedule, is the critical factor in producing learned helplessness.

Reward Can Produce Helplessness

If organisms are confronted with a series of uncontrollable aversive events, they will often fail to respond in a subsequent learning task. Similar behavior has been observed in animals which are exposed to uncontrollable positive reward (e.g., food) (1). In our study we have demonstrated an analogous phenomenon in children, i.e., a child's learning process can be disrupted by providing it with reward irrespective of his behavior, prior to the learning task. Seligman (2) labels all these findings "learned helplessness." He suggests that such behavior results because the subject learns in one situation that responding is useless for producing outcomes, (e.g., reinforcement or punishment) and, subsequently this belief is generalized to new situations.

The relationship between responding and reinforcement has traditionally been described in terms of two explicit contingencies: explicit contiguity results in acquisition of a response to obtain reinforcement; and explicit dissociation results in extinction of a response when it is no longer reinforced. Seligman believes learned helplessness results when a third relationship is learned: that responding and reinforcement are noncontingent (i.e., occur completely independent of each other). Noncontingency refers to a situation wherein the probability of reinforcement is constant, regardless of any response emitted by the organism.

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He is suggesting that the organism develops an expectancy that responding has no effect in relation to a given outcome and that the subject then reduces or ceases responding altogether. An important aspect of the theory is that when a subject has "learned to be helpless," this expectancy generalizes beyond the initial situation to disrupt learning in a subsequent situation where responding and reinforcement are contingent. Although undemonstrated, learned helplessness theory would predict that experience with uncontrollable positive reinforcement (reward) would lead to a learning deficit in humans, much like uncontrollable negative reinforcement has been shown to do. We sought to verify such a prediction.

The typical learned helplessness experiment presents subjects with an experience they cannot control and subsequently tests to determine how the experience effects their learning in a new situation they can control. Our uncontrollable experience was a series of 20 block designs drawn on 20 cm X 25 cm cards which were to be matched with a set of four blocks. Our controllable situation was a set of ten pencil mazes (3). A group of 8-10 year old children (Group CRF) were individually given 75 sec to match each of the designs and were informed that they would receive a poker chip for each time they played the "game" correctly. They were told the chips could be used to buy toys which were prominently displayed in the room. Prior to the actual experiment two demonstrations of how the blocks could be used to match the designs were conducted to insure the child understood the task. The task was made uncontrollable by presenting a chip to each child after each design regardless of how well he matched the design. Thus, regardless of the child's response it was always rewarded; the probability of receiving a chip (reward) was always the same, irrespective of the subject's response. To insure that the child did not assume the experimenter had a low standard for matching and to emphasize that his actual response was not important, only half the designs could actually be matched. The remainder were drawn such that no configuration of the blocks would result in a correct match.

After this procedure each subject was taken to a second room and was given 30 sec to complete each of 10 pencil mazes. The subjects were told if they got out of the maze within the time limit they would receive a chip. However, unlike the matching task, in this second phase the subjects were rewarded with a chip only when they correctly solved the maze within 30 sec. That is, reward was now contingent upon a specific correct response.

Several comparison groups and experimental control procedures were used to insure unambiguous interpretation of the results. To examine the efects of different schedules of uncontrollable reward on maze performance, two additional experimental groups were employed using the same tasks as Group CRF in both phases of the study. One group (Group NRF)

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was never given a chip regardless of their behavior and a second (Group 50-R) was randomly given a chip 50% of the time (4). In these groups, as in the continuous reward (CRF) group, reward was not contingent upon any response the subject made and thus we would also expect to observe "helplessness" in these groups.

So that a direct comparison could be made between these helplessness groups and the performance on the mazes that would be expected under "normal" circumstances, two additional groups were employed. One group, (Group CON) performed the first task but received reward only when they properly matched a design, i.e., reward was contingent upon a correct response. A second group (Group NPT) performed only the maze task so that performance uncontaminated by prior experience could be assessed.

Several control procedures were also employed to reduce any variance not due to the reward contingency manipulation. Elaborate precautions were taken to convince all subjects who participated in the first task that the second task was a completely different experiment. This was done to test the generalization of helplessness from the first phase and to convince subjects that the second task was not just a continuation of the first uncontrollable experience. After the first task was over the subjects were told the "game" was finished and dismissed. Five minutes later a second experimenter, who did not know which Phase 1 group the subject had served in, brought them into a different room to perform the maze task. To control for any differences in behavior that might result from sex differences between child and experimenter, the sex of the experimenter and child was counterbalanced such that an equal number of male and female subjects were tested in each task by a male or female experimenter. Ten subjects were assigned to each group with five females and five males per group. The last three mazes in the ten maze sequence could easily be completed in 30 sec to insure that all subjects had experience with success in the maze task. Following completion of the study, the subjects were extensively debriefed and the entire experiment was explained during a "party" where all subjects were equated in terms of number of toys obtained. It was repeatedly emphasized that it was the experimenter, and not the child, who had control over the experiment.

The results from Phase 2 confirmed our expectations, as well as the predictions of helplessness theory. The means for each group for both the number of mazes that the subjects failed to complete in 30 sec (Failures to Complete Mazes-FTCM) and latencies for completed mazes are shown in Table 1. It can be seen that, in terms of both dependent variables,

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Insert Table 1 about here

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the CRF, NRF, and 50-R groups were inferior to the control groups (CON and NPT). These observations are confirmed by the analyses of variance, which were significant, both for the FTCM (F = 3.78; d.f. = 4, 45; $p < .001$) and latency variables (F = 3.88, d.f. = 4, 45; $p < .001$). In addition, the individual group differences noted above were confirmed by post hoc analysis (Newman-Kuels tests at the .05 significance level). Thus, the present findings indicate that indiscriminate delivery of positive reward, when not made contingent upon a child's correct responses, can result in impaired performance on a subsequent task. In other words, uncontrollable positive reward in children can produce a learned helplessness effect very similar to that observed in both human and infrahuman subjects exposed to uncontrollable aversive stimulation.

Seligman (2) suggests that the learned helplessness phenomenon (or similar processes) may be responsible for a number of undesirable behaviors in humans. For example, Seligman has attributed certain motivational deficits, some emotional disturbances, disruptions in learning ability, depression, and in certain cases sudden traumatic death to learned helplessness (2). We believe that our results indicate that learned helplessness may be responsible for still other types of "ineffective" performance in humans. For example, we believe that the performance deficits observed in our study may be related to the kinds of behavior usually described for "spoiled" children. Often, children exhibiting certain characteristic behavior patterns have reinforcement histories wherein material rewards have been provided, irrespective of the child's behavior. It may be premature to suggest that our demonstration of uncontrollable reward-produced learning (and/or performance) deficiencies are analogous to the processes responsible for a spoiled child's

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behavior. However, the similarities between the subject's performance in our study and the types of behavior ordinarily attributed to spoiled children are quite striking. Our procedures were deliberately designed to have only a transitory effect to insure no lasting change in the child's expectancies. The tasks employed were both novel and did not include any of the child's normal daily activities. For such a cursory brush with uncontrollable conditions that were of little importance to the child ("we were playing a game"), it is somewhat surprising that our results were so unequivocal. We can only speculate as to the results of prolonged exposure to uncontrollable reward in situations important to the child's overall behavior pattern.

References and Notes

1. For example, F. Goodkin, Learn. and Mot., 7, 382 (1976); F. L. Welker, Learn. and Mot. 7, 394 (1976).
2. M. E. P. Seligman, Helplessness (Freeman, San Francisco, California, 1975).
3. The four blocks and ten mazes were adapted from the Wechsler Intelligence Scale for Children (WISC).
4. In Group 50-R subjects were randomly rewarded 50% of the time with half of their reward occuring on solvable designs and half on unsolvable..

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6. Address reprint requests to J. A. Seybert, Dept. of Psychology, C. B. Annex, University of Missouri, Kansas City, Mo. 64110.

Table 1

Failures to Complete Mazes (FTCM) and Latencies to Complete mazes (in sec) for all Groups in Phase 2

Dependent Variable	Group				
	NPT	CON	50-R	NRF	CRF
FTCM	1.3	2.0	3.0	3.4	3.5
Latency	18.4	18.6	20.5	20.9	22.8