Secondary stimulus control of a "new" operant incompatible with "running to the food magazine"

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Eight rats were conditioned to press a bar. A light was then established as a discriminative stimulus for the experimental animals, but not for the control Ss. Following discrimination training, the bar was removed and a new manipulandum, a chain, was introduced. After chain pulling was conditioned, the Ss were run to a 3 min. extinction criterion. The light was then turned on for 10 min. (no further reinforcement) and during this period the experimental group emitted significantly more chain pull responses than the control group.

In a recent paper (Wenrich & Cahoon, 1966) an experiment is reported in which a stimulus discriminative for one operant (pulling a chain) appeared also to exert control over a second operant (pressing a bar). Procedurally, the investigators conditioned one group of Ss (albino rats) to pull a chain in the presence of a light (S^D), but not when the light was off (S^Δ). Control Ss were exposed to the same S^D-S^Δ alternation, but were reinforced without attention to the S^D-S^Δ contingency. When a discrimination had clearly been established for the experimental Ss, all Ss were conditioned to press the chamber bar. Later, all Ss were extinguished with respect to the barpress to a 3-min. extinction criterion. When the light (S^D for chain pulling) was then turned on and left on for a 10 min. period, the experimental Ss emitted significantly more bar presses than the control Ss. Because the light was left on for a constant period of time it is evident that the influence of the light must have been one of facilitation rather than reinforcement.

However, an interpretation other than transresponse stimulus control is possible. Wyckoff, Sidowski, & Chambliss (1958) have suggested that any stimulus that provides a cue for running to the food magazine may also increase the probability that a manipulandum near the magazine will be operated. Thus, in the Wenrich and Cahoon study it might be argued that the bar was not pressed during the S^D for chainpulling because of transresponse stimulus control per se, but rather because of constant control of an operant that leads to heightened activity in the vicinity of the food magazine. The current study was designed to control for this possibility. That is, the "new" operant was selected to require the S to move *away* from the food magazine. This was assured by providing discrimination training on the bar press operant and then assessing the facilitative effect of this S^D on the chain pull operant. Because the chain was removed from the area of the magazine, discriminative control of "running to the food magazine" should actually *lower* chain pulling rate if this is the most important relevant variable.

Method

Subjects Eight experimentally naive male albino rats, approximately 70 days old at the initiation of the experiment were used. Throughout the experiment Ss were maintained at 85% ad libitum weight.

Apparatus. A Scientific Prototype Model A-105 Rodent Test Cage was used as the experimental chamber, in conjunction with standard recording and timing devices. In addition to the chamber bar a second manipulandum was represented by a removable chain inserted through the top of the chamber lid. The chain extended to within 5 in. of the floor of the chamber and terminated in a block of wood 1/2-in. long and 1/4-in. in the other dimensions. The chain was located directly in front of the food magazine, and slightly over 1/3 of the distance across the floor of the chamber from the magazine.

Procedure. The first five days of the experiment were devoted to magazine training and bar press conditioning for all Ss. During conditioning the number of reinforcing stimuli (45 mg Noyes pellets) was held constant for the experimental and control Ss. Days 6 through 15 (a total of 10 days) were allotted to discrimination training for the experimental Ss. A panel light (S^D) was presented during alternate 30-sec. periods, and the experimental Ss were reinforced only for bar presses emitted in the presence of the light. The control Ss were exposed to the same stimulus alternation but were reinforced for bar press responses without attention to the light on-light off contingency. On each day all Ss were run until a total of 70 reinforced responses had been emitted. Data from the discrimination training sessions indicates that responding for the experimental group came under stimulus control while no such discrimination was formed for the control Ss. A summary of responding during days 13-15 (the last three days of light on-light off alternation) reveals that the experimental Ss responded on a S^D-S^Δ ratio of 840:349, while the ratio for the control Ss was 427:413.

Following the discrimination phase of the experiment the bar was removed from the chamber, the chain introduced, and the panel light left off (day 16). Each S was reinforced for 70 chainpull responses.

On day 17 (test day) all Ss were run to extinction on the chain pulling operant. The extinction criterion was 3 consecutive min. without responding. During the extinction process the experimental Ss emitted a total of 777 responses and the control Ss 720 responses, a difference that is not significant at the .01 level (χ^2 = 2.10 1 df). When the extinction criterion was reached the panel light was turned on and left on for 10 consecutive

min., and the number of chainpull responses recorded for all Ss.

Results and Discussion

An examination of Table 1 reveals that the experimental Ss emitted significantly more chainpull responses in the presence of the light than did the control Ss ($\chi^2 = 81.34$ 1 df, $p < .001$).

It is evident that the light, although never present with the chain during conditioning, exerted control over the chain pulling operant. Because the light was presented on a continuous basis during the test period, an interpretation based upon conditioned reinforcement cannot reasonably be made. Therefore, it would appear that control by a discriminative stimulus has been demonstrated to exist across response classes that are not topographically similar. As such, the results seem to confuse further the multitudinous implications of the secondary reinforcement literature. Certainly at least some of the studies in which new operants have been established by "conditioned reinforcement" would appear subject to reinterpretation. Further, it would appear that this response facilitation cannot be accounted for simply in terms of heightened activity in the vicinity of the food magazine. Obviously, the systematic role of the discriminative stimulus continues to be quite unclear.

Table 1. Total number of chainpull responses emitted during 10 min. of continuous panel light presentation. The light had earlier been made an S^D for bar pressing for the experimental Ss only.

Experimental Subjects	Number of Responses	Control Subjects	Number of Responses
E_1	123	C_1	54
E_2	32	C_2	10
E_3	107	C_3	27
E_4	59	C_4	36
Totals	321		127

One interpretation of the results of this experiment must be considered. That is, if the light stimulus served as a general "energizer" for the experimental Ss, they might be expected to do more of everything (including chainpulling) than the control animals. Observation of the experimental Ss relative to their "directedness" to the chain manipulandum suggests that this post hoc explanation would almost certainly be specious.

References

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