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The effect of shock prod preexposure on conditioned defensive burying in rats

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Experimentally naive male rats were tested for conditioned defensive burying following four sessions of preexposure to the test chamber with (CS preexposed group) or without (control group) the shock prod present. Subjects preexposed to the shock prod engaged less time in conditioned defensive burying and accumulated smaller piles of bedding material than the control subjects. Since all subjects touched the prod and received the electric shock on the conditioning day, it was suggested that in this preparation, shock prod preexposure retards the emergence of conditioned defensive burying but does not inhibit initial contact with the to-be-conditioned stimulus.

Pinel and his colleagues have recently demonstrated that rats shocked once by a wire-wrapped stationary prod will bury the prod if suitable materials are available (e.g., Pinel & Treit, 1978, 1979; Terlecki, Pinel, & Treit, 1979). Terlecki et al. (1979) termed this behavior "conditioned defensive burying" (CDB) and argued that its emergence was due to the conditioned association of the prod and shock. Although rats will bury some novel objects that are not sources of aversive stimulation (unconditioned defensive burying, UDB), they will quickly learn to selectively bury an object that has been the source of aversive stimulation (Terlecki et al., 1979).

If the burying preparation is viewed within the Pavlovian schema, then CDB may be seen as a conditioned response (CR) that results from the association of the stationary prod, or conditioned stimulus (CS), and the shock, or unconditioned stimulus (US). Given this conceptualization, one may ask if outcomes observed in other conditioning preparations are also demonstrable within the CDB situation. For example, it has been demonstrated in a variety of preparations that conditioning is retarded if it is preceded by nonreinforced presentations of the CS, an outcome labeled latent inhibition (Lubow, 1973) or learned irrelevance (Mackintosh, 1973). The present study examined the effects of preexposure to a wire-wrapped stationary prod on CDB.

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METHOD

Subjects

Fourteen experimentally naive male albino Wistar rats purchased from Laboratory Supply Company, Indianapolis, Indiana, served as subjects. The mean weight of the subjects was 361 g (range: 346-388 g). All subjects were individually housed, with water and food available in their home cages at all times.

Apparatus

Subjects were tested in a wooden enclosure (30.5 cm wide, 43.5 cm long, 30.5 cm high) that had one of the side walls constructed of clear Plexiglas. Located in the center of the ceiling was a 6-W white houselight (Sylvania S6, 120 V ac) that illuminated the test chamber at all times. The floor of the chamber consisted of 5 cm of wood shavings (Ground Wood Fiber 3, from Angelus Sawdust Products, Los Angeles, California).

The shock prod was a .5-cm-diam wooden dowel, wrapped with uninsulated wire and covered with black masking tape. When in place, the shock prod extended 6.5 cm into the test chamber from the center of one end wall and was 2 cm above the bedding material. Aversive stimulation consisted of a brief shock (14 mA), initiated by the experimenter, terminated by the withdrawal of the subject, and delivered through the uninsulated wires wrapped around the prod.

Procedure

Subjects were randomly divided into an experimental (n = 6) and control (n = 8) group. The experimental subjects were habituated to the test chamber in one squad of six, the control group in two squads of four subjects. All subjects received four habituation sessions, 30 min/day over 4 days, with testing taking place on Day 5. For the experimental group, the shock prod was in place, but nonfunctional, during the habituation sessions; for the control group, the shock prod was absent during the sessions.

Following habituation, all subjects were individually conditioned in the following way. Each subject was individually placed in the center of the test chamber, facing away from the shock prod. When the subject touched the prod with a forepaw, the experimenter initiated the shock that terminated upon the

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withdrawal of the subject. Following the US delivery, the subject remained in the test chamber for 15 min. During this interval the experimenter timed the number of seconds the rat engaged in burying behavior. Any pushing, spraying, or digging of the bedding material directed toward the prod was incorporated into the burying time measure. After the test, the subject was removed and the height of the highest pile of bedding material was measured. Additionally, the height of the bedding material at the base and tip of the shock prod was measured and averaged to yield a mean height at prod measure. The floor of the chamber was then smoothed to a uniform 5-cm height, and the next subject was tested.

RESULTS AND DISCUSSION

Figure 1 depicts the group means for the measures employed. A t test revealed that the control group accumulated significantly higher piles of bedding material [$t(12) = 8.58$, $p < .001$, two-tailed] and spent more time engaged in burying behavior [$t(12) = 2.53$, $p < .05$, two-tailed] than did the CS preexposed group. However, the average height of bedding material at the prod only approached a significant difference [$t(12) = 1.84$, $p < .08$]. In short, two of the three measures clearly indicated that preexposure to the CS prior to the conditioning episode significantly reduced the amount of CDB. Failure of the average height of the bedding material at the prod to clearly distinguish between groups may be accounted for in the following way. Although the control group spent more time burying and accumulated higher piles of bedding material, these piles may not have been located directly at the base or tip of the shock prod, where the measurements were taken. In fact, informal observations indicated that the major accumulations of bedding were frequently located directly in front of or to one side of the tip of the shock prod.

This study had clearly demonstrated that preexposure to the shock prod prior to the conditioning episode had a detrimental effect on CDB. CDB may thus be viewed as somewhat similar to a variety of other conditioning preparations that demonstrate decremental CS preexposure effects. Whether the preexposure effects are best accounted for in terms of Lubow, Schnur, and Rifkin's (1976) view of "conditioning of inattention" or Mackintosh's (1973) concept of "learned irrelevance" cannot be determined. Although both conceptualizations may be employed to account for the data, it is also the case that both views encounter some difficulty in the present instance. Common to both the conditioning of inattention and learning of irrelevance hypotheses is the assumption that following CS preexposure, the organism comes to ignore the CS, and it is this that retards subsequent conditioning. However, this cannot be the case in the present instance, because during the conditioning phase the preexposed subjects did in fact approach and contact the prod. It may be argued that preexposed subjects had a longer latency before touching the prod and therefore did learn that the prod was irrelevant. However, even if this is granted, it does not

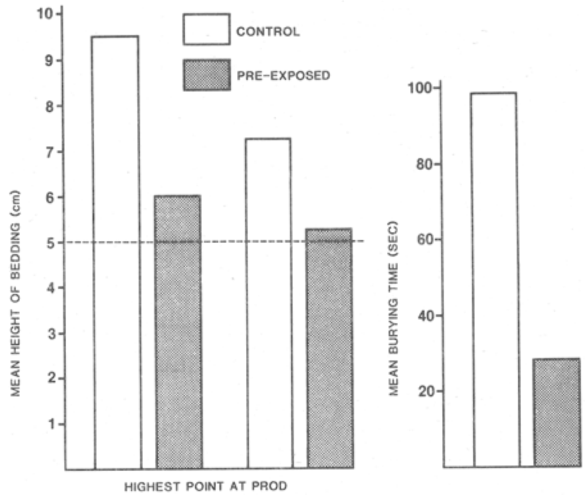

Figure 1. Mean height of burying material at the highest point in the chamber, at the prod, and mean burying time for control and CS preexposed subjects.

account for the fact that these subjects did touch the prod and received the US but failed to engage in prod-directed CDB.

The present findings suggest that for CDB to emerge, the source of aversive stimulation must be relatively novel. Additionally, CS preexposure does not appear to reduce contact with the CS but instead prevents the occurrence of the response after exposure to both the CS and the US. In short, CDB may be somewhat different from traditional conditioning preparations in which CS preexposure retards contact with the CS, and it is this that delays subsequent conditioning. Although in the present instance, CS preexposure was relatively long, it remains to be seen if shorter or more infrequent preexposures would have equally detrimental results on CDB.

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