Retention of latent inhibition in a taste-aversion paradigm

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Rats were preexposed to saccharin for five sessions. Then two groups were given a saccharin-lithium pairing while two other control groups received saccharin-placebo. One group in each of these conditions received the pairing 1 day after preexposure, the other after 24 days. Latent inhibition was demonstrated in the 1-day poisoned group (a very transient aversion was evident on the choice test). Substantial aversion, however, occurred in the 24-day subjects, indicating a dissipation of latent inhibition over time.

It is well known that preexposure to a flavor retards later conditioning when that flavor is used as a CS in a taste-aversion paradigm (e.g., Kalat & Rozin, 1973). This effect (termed "latent inhibition," e.g., Best, 1975; Siegel, 1974) is evident after even one preexposure session (Kalat & Rozin, 1973). A number of investigators, however, have shown that conditioning still is possible following flavor preexposure (e.g., Nachman & Jones, 1974), although it may require several CS-US pairings to obtain a strong aversion (e.g., Fenwick, Mikulka, & Klein, 1975).

Although the strength of the latent inhibition as a function of the number of preexposure sessions has been studied thoroughly (e.g., Fenwick et al., 1975), relatively little is known about the extent to which latent inhibition dissipates with time. Kalat and Rozin (1973) failed to obtain aversive conditioning even when 3 weeks elapsed between the one preexposure session and the CS-US pairing. In other words, latent inhibition was retained fully over 21 days. Other research, however, has suggested that latent inhibition does dissipate over time. Mitchell, Kirschbaum, and Perry (1975), for example, poisoned rats after they had consumed food from two familiar (i.e., preexposed) containers. Toxicosis produced subsequent avoidance of the relatively novel container, that is, the one that the subjects had not experienced for 24 days.

We have examined this issue using a design similar to that of Kalat and Rozin (1973). Subjects received 5 days of preexposure to a flavor followed by taste-aversion training. These two phases of the study were separated by either 1 or 24 water sessions. We predicted

that latent inhibition would be evident for the 1-day subjects but not for the 24-day rats.

METHOD

Subjects

The subjects were 40 male and female Sprague-Dawley rats weighing 200 to 300 g. They were housed in individual wire-mesh cages and had ad-lib access to food throughout the experiment. The colony room was maintained on an 8:00 a.m. to 8:00 p.m. light/dark cycle and all testing was done at about 4:00 p.m. during the light portion of the cycle.

Procedure

Subjects were maintained on a 23.8-h water-deprivation schedule and given from 18 to 41 daily drinking sessions, depending on their group assignment. A session consisted of placing a single calibrated drinking tube on the right front of the home cage and measuring fluid consumption for 20 min (Sessions 1-6) or 10 min (all remaining sessions).

On Sessions 1-10, water was presented and a baseline drinking rate was established. On Days 11-15, all subjects were presented with a .1% saccharin solution rather than water. These solutions constituted the preexposure phase of the experiment. Following the 5th preexposure day, subjects were randomly assigned to one of four groups (10 animals per group). Group 1-LiCl was given one additional water session (Day 16) and, on Session 17, was again given saccharin followed immediately by an injection of lithium chloride (i.p., 10 ml/kg, .15 M concentration). Group 1-Sal was treated identically (i.e., one water session on Day 16 and saccharin and injection on Session 17) except that the injection consisted of an equal volume of isotonic saline. Group 24-LiCl received 24 water sessions (Days 16-39) following the CS preexposure phase. On Day 40, those subjects were given saccharin and, immediately following, an injection of lithium chloride. Group 24-Sal was given the same treatment except that on the training day those subjects received a saline injection.

On the day following training (i.e., Day 18 for Groups 1-LiCl and 1-Sal or Day 41 for Groups 24-LiCl and 24-Sal), subjects were tested for aversion to the saccharin flavor. The two-bottle testing procedure consisted of placing a water tube on the left front of the cage and a saccharin tube on the right. Fluid consumption from each tube was measured after .5, 1, 3, 6, and 18 h and a preference ratio for each individual time period (saccharin to total intake) was computed.

In summary, the experiment consisted of a 2 by 2 by 5 factorial design, with 1 vs 24 intervening water sessions between preexposure and training, lithium chloride vs placebo injection on the training day, and hours on the choice test as the factors.

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Figure 1. Mean suppression ratio (saccharin to total consumption) on the five test periods for the four groups.

RESULTS AND DISCUSSION

The results are shown in Figure 1. Analysis of the mean preference ratios for each group during each measurement period on the test revealed highly significant main effects of treatment [$F(1,35) = 22.2, p < .01$], measurement periods [$F(4,140) = 8.8, p < .01$], and injection condition [$F(1,35) = 36.7, p < .01$]. Furthermore, all of the interactions were significant: specifically, Treatment by Injection [$F(1,35) = 6.4, p < .05$], Treatment by Test Periods [$F(4,140) = 5.3, p < .01$], Injection by Test Periods [$F(4,140) = 5.5, p < .05$], and Treatment by Injections by Test Periods [$F(4,140) = 4.3, p < .01$]. Multiple comparisons, using Sheffé's test, indicated that the mean preference ratio for Group 24-LiCl was significantly lower than for the saline control groups on all measurement periods ($p < .01$ in all cases). In addition, during the first ½ h of the test, the mean ratio for Group 1-LiCl was significantly lower than that exhibited by the two control groups ($p < .01$). However, this mean ratio increased to .92 (i.e., to the level of the control groups) by 1 h of testing. The 1-LiCl and 24-LiCl groups differed on the second and third time periods. By 6 h of testing, none of the differences between group mean preference ratios was significant.

The major finding of this study was that a very transient aversion developed in the 1-LiCl subjects, but a much stronger, and longer lasting, aversion occurred in the 24-LiCl group. Clearly, the extended series of water

sessions following preexposure restored much of the viability of the flavor CS. Stated differently, latent inhibition dissipated to a significant degree within 24 days (although it is not possible to determine from the present design whether it dissipated totally). The present results, therefore, fail to confirm the study by Kalat and Rozin (1973), who found that latent inhibition was retained fully after 3 weeks. There are a number of methodological differences that easily could account for this discrepancy, including the use of a different flavor CS.

Although the present results provide very little direct information concerning the mechanism for latent inhibition, they are compatible with the attention-loss theory (e.g., Halgren, 1974). Specifically, attention to a CS may be a function of the relative novelty of that CS. In the present study, as in the one by Mitchell, Kirschbaum, and Perry, (1975), relative novelty (and, thus, attention value) was restored after an extended period of habituation to a constant environment.

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