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Test of aversiveness of a 39-kHz tone to hooded rats

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Eight Long-Evans full-term male rats were used to test the aversiveness of a 39-kHz tone. The tone was generated by a RCM Enterprises, Inc. ultrasonic motion detector which utilizes the tone to measure activity. Aversiveness was determined by amount of time subjects remained in the presence of tone since the subjects could control tone onset and offset. Analysis showed that the tone was not aversive and that the motion detector has utility as a research tool for this species.

Cunningham and Anderson (1974) used a "preshock" vs. no "preshock" paradigm with the presence of a tone during punishment of a water-licking response. They found that the presence of the tone at the tested values had no suppression effect. To reject the hypothesis that the tone was inaudible to the subject, the tone was paired with inescapable electric shock. Their results showed the tone to be audible to their rats, a finding which agrees with those reported by Gould and Morgan (1941). Cunningham and Anderson (1974) suggested that the 39-kHz tone may be aversive in other situations (cf. Anderson, Cunningham, & Simons, 1970).

Since a 39-kHz tone is utilized in a commerically available motion detector, Model US3-400, RCM Enterprises, Inc. (Dabbs, 1973), it becomes important to ascertain whether this frequency is in fact aversive to rats. Following a model proposed by Thorndike (1931), a simple choice test was conducted.

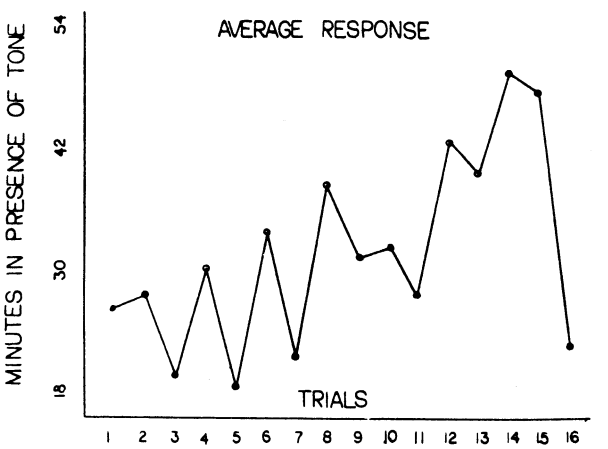

Figure 1. Mean number of minutes spent by all subjects in the presence of 39-kHz tone across 16 h.

METHOD

Subjects

The subjects were eight male full-term hooded rats, Long-Evans strain, maintained on an ad-lib feeding schedule for 21 days prior to experimentation. They were deprived of food and water during the experimental session. All subjects had a previous experimental history of traversing a straight runway to escape shock.

Apparatus

A 39-kHz tone at 16 dB was generated by an RCM Enterprises, Inc. ultrasonic unit, Model US3-400. The subject was confined to an experimental chamber measuring 45.7 x 45.7 x 30.5 cm. A photocell was placed on one wall in the middle of the chamber 2.54 cm from the floor with the infrared light source on the opposite wall. If the subject interrupted the light beam, the tone and a clock (to nearest second) were actuated. When the subject again interrupted the light beam, the tone and clock stopped immediately.

Procedure

Two experimental sessions of 8 h each were conducted for each subject. For data analysis, the total time was divided into 16 1-h trials. The subject was exposed to the tone whenever he was on one side of the chamber. Since one side of the chamber was associated with the presence of tone, to prevent position preferences from obscuring the effect of the tone, the tone side was reversed for one group (N = 4) during the second session.

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RESULTS

If the tone were an aversive stimulus, the results would show that the time spent in presence of tone would be less than the time spent in the side of chamber where the tone was off.

Average performance of all subjects is shown in Figure 1. The mean time in absence of tone was 27.32 min, significantly different from an expected "aversive" mean of 60.00 min ($\chi^2 = 107.8$, $df = 1$, $p < .001$). Analysis of position across trials showed this difference also to be significantly different from an expected "aversive" mean per trial of 60.00 min ($\chi^2 = 132.1$, $df = 7$, $p < .001$).

To determine whether the subject showed any change in preference (i.e., learning) during the hours spent in the chamber, an analysis of variance was conducted. If anything, the number of minutes spent in the presence of the tone increased across hours. Neither treatments nor the interaction of treatments by trials were significant.

DISCUSSION

The findings clearly support the conclusion that the tone is not an aversive stimulus. Perhaps the conclusion reached by Anderson et al. (1970) might be due solely to the pairings of the tone with shock.

These data show that the tone per se is not aversive and support statements such as that by Dabbs (1973) that the RCM Enterprises, Inc. ultrasonic motion detector can be an effective unobtrusive instrument for measuring activity.

REFERENCES

Anderson, D. C., Cunningham, C., & Simons, R. Intensification of passive-avoidance learning as a function of pre-shock and a 39 kHz tone. Proceedings of the 78th Annual Convention of the American Psychological Association, 1970, 247-248.

Cunningham, C., & Anderson, D. C. The effects of a 39-kHz tone on passive-avoidance learning in preshocked rats: A failure to replicate. Bulletin of the Psychonomic Society, 1974, 3, 121-122.

Dabbs, J. M., Jr., & Clower, B. J. An ultrasonic motion detector with data on stare, restriction of movement, and startle. Behavior Research Methods & Instrumentation, 1973, 5, 475-476.

Gould, J., & Morgan, C. Hearing in the rat at high frequencies. Science, 1941, 94, 168.

Thorndike, E. L. *Human learning*. New York: Century, 1931.

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