THE USE OF PINCH AS AN AVERSIVE STIMULUS

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Electric shock is the most commonly used aversive stimulus for conditioning animals. In the present experiments, in which electroencephalograms were recorded with chronically implanted cortical and subcortical electrodes in monkeys (*Macaca mulatta*) during avoidance conditioning, shock often introduced undesirable 60-cycle per second artifacts into the EEG records. For this reason, foot or tail pinch was tried as a means of maintaining the avoidance performance without producing artifacts in the EEG record. Other experimenters may find the pinch stimulus useful as a new aversive stimulus in place of electric shock.

The monkeys were restrained in chairs similar to those described by Brady, Porter, Conrad, and Mason (1). The pinch was produced by a sudden release of 40 to 50 pounds per square inch of air pressure to a metal syringe chamber which drove a piston with a serrated edge against the monkey's foot or tail. The animal's foot or tail was held in position under the piston by means of pins inserted into a specially drilled metal "punchboard."

The monkeys were originally trained with electric shock on a discriminated avoidance procedure similar to one described by Sidman (2); the shock-shock and the response-shock intervals were 20 seconds. After 10 seconds of no response, a warning clicker was presented until the shock occurred; however, a lever-press during the clicker terminated it and delayed the shock as usual. If the animal allowed the shock to occur, three lever presses were required to terminate it. After the initial training with electric shock, the shock was replaced by the pinch stimulus.

The efficacy of pinch as an aversive stimulus is illustrated by cumulative records in Fig. 1. In an early training session, just previous to the one illustrated, the

Figure 1. Cumulative-response records of Monkey M-XII illustrating the use of tail pinch as an aversive stimulus. The hash marks indicate the application of the pinch. At the arrow in Record A the pincher was turned on. In Record B, *a* designates a run of responses which often follows a pinch. A period of steady responding, typical of the final state of this avoidance procedure, occurs at *b*.

monkey pulled its tail out of the pincher and its avoidance responding was extinguished. At the start of the session (Record A), the avoidance procedure including the clicker was presented as usual except that no pinch was delivered if the monkey failed to press the lever. During the first few minutes the monkey responded occasionally, but the rate soon decreased to a near-zero level and at times the monkey went to sleep. After 18 minutes, the pincher was turned on (arrow in Record A), the monkey responded to the pinch, and the avoidance behavior was reinstated (Record A) and maintained as shown in lines B and C, at 3 and 10 hours, respectively.

When the shock was used as the aversive stimulus in the next training session for this monkey, the rate of responding was very close to the rate obtained with the pinch stimulus. At the present time, three monkeys are being maintained on conditioned avoidance by the use of the tail pinch. No damage has been noted to the monkey's tail from the pincher in sessions which last up to 6 hours. In overnight sessions the tail may be bruised by the pincher but there is little edema and recovery occurs in 2 to 3 days.

REFERENCES

1. Brady, J. V., Porter, R. W., Conrad, D. G., and Mason, J. W. Avoidance behavior and the development of gastroduodenal ulcers. *J. exp. anal. Behav.*, 1958, 1, 69-72.
2. Sidman, M. Some properties of the warning stimulus in avoidance behavior. *J. comp. physiol. Psychol.*, 1955, 48, 444-450.