Stimulus novelty effects during stimulus equivalence testing*

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An analysis is performed on the transfer test data from an experiment which factorially combines percent reward (50% vs 100%) and duration of confinement (2 vs 20 sec) in the presence of cue values from two redundant stimulus dimensions. Rats perform better on test trials which pair the previously negative cues with novel compound cues than on trials in which the previously positive cues are paired with a novel compound. Long confinement durations and partial reward during acquisition increase this difference. The results give further evidence that novelty affects test performance in single-dimensional transfer tests following redundant cue training.

There has been a recent resurgence of interest in stimulus equivalence testing as a means of assessing what is learned during discrimination training. A typical paradigm involves first training Ss on a discrimination which has redundant dimensions, then giving test trials which separately evaluate performance on each of the dimensions. During these (single-dimensional) test trials, the positive and negative value of one (test) dimension are presented along with one of the cue values of the other (nontest) dimension. An appropriate response (choice of the positive compound, when present, or avoidance of the negative compound, when present) is taken as evidence of learning about the tested dimension. However, single-dimensional test trials introduce stimulus compounds which were not present during learning, and the test involves a choice between an old and a new compound. For example, if black (B) horizontal (H) bars were positive (BH+) and white (W) vertical (V) bars were negative (WV-), then a test for brightness could be BH (old positive compounds) vs WH (new compound) or WV (old negative) vs BV (new), etc. Therefore, any tendency to respond on the basis of the previous reward history associated with the tested dimension may be confounded or concealed by tendencies to select the novel compound. Such a possibility was recently revealed by Mumma & Warren (1968), who analyzed test trial performance for those trials involving the old positive compound separately from those trials involving the old negative compound.

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The present report is based on a similar analysis performed on data from a recent study (Cranford & Clayton, 1970) but not discussed in the previous report. The basic design of that study was a 2 by 2 factorial combining two levels of *confinement duration* (2 and 20 sec) and two levels of *reward percentage* (50% and 100%). Each of four groups of Ss was confined in the presence of two cue values from two relevant dimensions but received reward and nonreward in a goalbox which did not contain the cues. One of the dimensions was the brightness of alley floors (dark and light) and the other was the texture of the floors (rough and smooth).

PROCEDURE

The details of the training and testing procedures are reported elsewhere (Cranford & Clayton, 1970). Briefly, the Ss (64 rats) were first trained in a double-runway choice apparatus to an acquisition criterion and then given 20 days of equivalence testing. On each of these test days the rats received a single-dimensional brightness and a single-dimensional texture test trial interspersed among four retraining trials on the original discrimination problem. There were two kinds of test trials: S+, which paired the previous positive compound with a novel compound, and S-, which paired the previous negative compound with the novel compound. These two kinds of test trials were administered equally often.

RESULTS

Over the 20 days of testing, the mean performance level for all Ss on the S+ test trials was 66.85% correct and that on the S- test trials was 77.80% correct. This is a significant main effect [$F(1,48) = 42.67$, $p < .01$] by analysis of variance. Valence type (S+ vs S-) was involved in two significant two-way

interactions, Valence by Percent Reward [$F(1,48) = 9.48$, $p < .01$] and Valence by Confinement Duration [$F(1,48) = 20.91$, $p < .01$]. The 100% Ss scored 72.5% correct on the S+ test trials and 78.3% correct on the S- test trials. The 50% Ss, on the other hand, scored 61.25% correct on the S+ test trials vs 77.35% on the S- test trials. In other words, the difference in performance on the S+ vs S- trials was larger for the 50% than for the 100% Ss. Turning to the interaction involving confinement duration, the 20-sec Ss performed much better (79.85% correct) on the S- trials than they did on the S+ trials (61.25% correct). Although in the same direction, the differences for the 2-sec confinement Ss were not significant (75.80% and 72.50% correct, respectively).

DISCUSSION

Although the previously positive cue was preferred to a novel cue, the present study replicates, with rats, Mumma & Warren's (1968) basic finding with cats. Rats were found to perform better on test trials which contained previously positive compound cues. Mumma and Warren interpreted their results as supporting the hypothesis that an animal's performance on single-dimensional test trials is a joint function of avoidance of previously nonrewarded cues plus approach to newly introduced novel cues. The finding in the present experiment, that the previously positive cue was also preferred to the novel compound, suggests that the rats might also have acquired an approach response during acquisition. In addition, the present study has shown that these effects can be exaggerated by the use of partial or delayed reward during acquisition. Although alternative explanations are possible, one way to account for the Delay by Valence Type and the Percent by Valence Type interactions is to suggest that delayed and partial reward each decreased the efficacy of the positive cue without an accompanying (significant) change in the avoidance of the negative cue.

REFERENCES

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