Effect of variation in motivational level during brightness SDR training among Squirrel monkeys¹

ROBERT GOSSETTE and PHILIP SLONIM, *Comparative Animal Behavioral Laboratories, Hofstra University, Hempstead, L. I., N. Y. 11550*

Since previous research has demonstrated that Ss trained on a successive discrimination reversal task under conditions of high drive show performance inferior to that obtained under conditions of low drive, an experiment was designed to discover whether a shift from low drive to high drive conditions during the course of reversal training would also lead to increased errors. Three Squirrel monkeys previously trained on a brightness reversal task under 10% body weight reduction, were shifted to a 30% weight reduction for continued training. Rather than an impaired performance, errors were actually reduced by the shift to high drive.

Over the past decade successive discrimination reversal (SDR) methodology has emerged as one of the more promising approaches to the calibration of interspecies performance differences (Bitterman, 1965; Warren, 1965). However, only a gross nominal description of interspecies performance differences has usually been attempted, with a division of all species tested into either those that displayed or failed to display an improvement, e.g., error reduction, across succeeding reversal problems. Occasionally an intermediate category has been constructed (Bitterman, 1965) for species that apparently showed error reduction on simple but not on more difficult SDR tasks. Attempts to quantify interspecies differences directly in terms of obtained response measures, e.g., errors per problem, etc., have usually been dispensed, generally because of obvious methodological grounds such as differing apparatus, criterion and procedures, gross interspecies sensory-motor differences, or less obvious intuitive grounds.

To examine the feasibility of direct calibration of interspecies differences in response measures among groups of relatively homogeneous species, with presumably minimal sensory-motor differences and, at the same time, to explore the sensitivity of SDR methodology to finer taxonomical interspecies differences, an extended study of SDR learning of birds and selected mammalian families was initiated in this laboratory (Gossette, 1966). The results to date suggest that direct calibration of interspecies differences via obtained response measures is possible, yielding rank ordering of species that is consistent with phyletic or taxonomic ordering (Gossette, Gossette, & Riddell, 1966; Gossette, Kraus, & Speiss, 1968).

One major class of criticisms of such comparisons stems from the problem of equating motivational and incentive levels across species on the task employed in SDR calibration. In short, could the obtained performance differences be due merely to uncontrolled and unassessed variation in motivational and/or incentive levels?

To test for this possibility, the influence of these two variables upon SDR measures has been examined across several species (Gossette & Hood, 1968; Gossette & Feldman, 1968). The outcome was that both variables did, in fact, control SDR performance, with low motivational and high incentive conditions yielding the least negative transfer, fewest errors. However, the magnitude of such influence was generally not sufficient to erase interspecies differences, even among taxonomically closely related species, e.g., pigeons and doves.

Interestingly, among the pigeons and doves the effect of the motivational variable was most pronounced during the early

reversal problems, while among squirrel monkeys the superiority of the low drive Ss was uniformly persistent throughout reversal training. This raises the question of whether or not the squirrel monkeys were more sensitive to the motivational variable than the two avian species. As a preliminary step in answering this question, a group of squirrel monkeys that had already completed 20 problems of a brightness SDR task under conditions of low drive level were shifted to a high drive level and continued for an additional 20 brightness reversals to see if their errors would show a corresponding increase.

METHOD

The Ss were three adult squirrel monkeys that had previously received 20 spatial and then 20 brightness reversal problems in a formboard chamber, previously described (Gossette & Feldman, 1968), under conditions of 10% body weight reduction. After completion of the 20th brightness problem, all Ss were returned to ad lib feeding schedules to check ad lib weight values for a period ranging from two to three weeks. The new ad lib weights closely approximated those originally obtained, from 595 to 630 g. At this point all Ss were placed upon a deprivation schedule to lower their weights to 30% of ad lib values over the next two to three weeks. As each S attained its assigned weight loss it was continued on the brightness SDR task. As before, training consisted of a daily 20-trial session, with noncorrection, and a reversal criterion of no more than two errors per session. One quarter of a grape served as a reward.

RESULTS AND DISCUSSION

In a previous study (Gossette & Feldman, 1968) a 30% body weight reduction group showed consistently more errors and heightened initial errors. Accordingly these two measures, obtained before and after a shift in drive level, were analyzed for each S. Preshift data was taken from the last 10 problems of the original brightness SDR experiment, e.g., Problems 11 to 20. By Problem 11, all Ss had fairly stable initial errors, but still showed some decline in errors per problem. Figs. 1 and 2 show, respectively, individual and group functions for initial errors, and errors per problem, across 20 preshift and 20 postshift problems. As can be seen, all Ss show either no

Fig. 1. Individual and mean initial error per problem on a brightness SDR for 3 squirrel monkeys before and after a shift in drive level.

Fig. 2. Individual and mean error per problem on a brightness SDR for 3 squirrel monkeys before and after a shift in drive level.

appreciable change, or a decrease following shift to a higher level of drive in both measures. Comparing the mean of the last five preshift problems with the mean of the first five

postshift problems reveals that all Ss declined on both measures. However, comparisons of preshift and postshift latencies indicated that the latter were significantly lower, reflecting increased motivation.

It would appear that variation in drive level following extended SDR training does not influence error scores of squirrel monkeys. Rather than an expected increase, there was a decline in errors. There was, unfortunately, one major variable that could not be properly controlled. The process of redetermination of ad lib weights and effecting the new weight reductions required approximately one month. Whether or not this "rest" could have obscured an increase in errors due to drive shift cannot be decided. Additional Ss with the proper training were not available to serve as a control for the "rest." It has been our belief, based upon casual observation of avian groups that had been interrupted late in reversal training that such pauses did not exert any appreciable influence upon subsequent reversal performance.

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NOTE

1. Supported in part by NSF Grant No. GB-4799 awarded to the senior author.