The effect of knowledge of another's accuracy on two-choice probability learning[1]

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Ss performed on a 70-30 probability learning task. Ss in experimental groups could see that another S was correct either 20% of the time (Group E-20) or 80% of the time (Group E-80). Control (C) Ss had no knowledge of another's accuracy. Male Ss in the E-80 group chose the more frequently correct response more often than male E-20 or C Ss. No differences among conditions were found with females. It was suggested that knowledge of another's high competence has motivating effects for males.

Rosenbaum and his associates (Rosenbaum & Tucker, 1962; Rosenbaum, Chalmers, & Horne, 1962) found that Ss more readily imitate a competent than an incompetent model. They interpreted their findings primarily in terms of transfer from a history of more frequent reward for imitation of competent rather than incompetent models. Another possible interpretation is that the discrepancy between the model's accuracy and S's accuracy may have motivational consequences that affect S's mode of response. For instance, if an S is performing at a 50% (chance) level, as Ss tend to do initially in the two-choice problem used by these Es, he may interpret his performance differently when observing a model who is 80% correct than when observing a model who is 20% correct. In the former case chance accuracy may be considered "failure," while in the latter case the same performance level may be considered "success." The present experiment investigates the effect of such discrepancies in accuracy on S's performance in a two-choice probability learning task.

Method

Two Ss were seated facing a panel on which several lights were mounted. When a white signal light was illuminated in front of an S, he responded by pressing one of two buttons on the arm of his chair. Pushing a button turned on a green or a red light mounted on the panel slightly to the right of the responding S's position. The green light was mounted next to the word "correct;" the red light was mounted below the green light next to the word "incorrect."

Each S was instructed to press one of the two buttons when his signal light was illuminated. In the two experimental conditions, E-80 and E-20, the responses of the Ss on the left were designated correct on 80% and 20% of their trials, respectively, regardless of which button was pushed. This provided the experimental manipulation for the Ss on the right. (The responses of the Ss on the left are irrelevant to the experiment and will not be discussed.) For these conditions, a movable partition (which prevented Ss from seeing one another) was placed so that the S on the right could see the "correct" and "incorrect" lights of the S on the left. In two control conditions, C-1 and C-2, the partition was positioned in a way which prevented Ss from seeing these lights. In condition C-2, one S sat on each side of the panel, but in condition C-1 only one S was present.

For Ss seated to the right of the partition in the E-80 and E-20 conditions, and for all Ss in the C-1 and C-2 conditions, the left button would turn on the green light on 70% of the trials according to a prearranged schedule. The right button was "correct" on the other 30% of the trials.

In all conditions except condition C-1, each S was exposed to 20 trials and then waited while the other S responded for 20 trials. This alternation continued until each S responded on 180 trials. In all conditions except C-1, the S on the left always responded first. For condition C-1, alternations were replaced by 75-sec. delays, the time required for completion of 20 trials.

The instructions indicated that S was to guess which button was correct on each trial and the function of the green and red lights was presented. The instructions did not call S's attention to the other S's green and red lights. As previously noted, C-1 and C-2 Ss could not see the other S's lights.

Ss were recruited from elementary psychology classes.

Results

The number of times that Ss chose the more frequently correct (left) button per block of 20 trials served as the dependent measure. Due to disproportionality in number of Ss in each condition, the data were analyzed by a three-factor (Other's accuracy, Sex, Trials) unweighted means analysis of variance. Since this analysis indicated an interaction of Other's accuracy and Sex ($F = 3.17$, $df = 2/74$, $p < .05$), further analyses treated data for males and females separately, employing the error terms from the original analysis. In all analyses the C-1 and C-2 groups were combined into a single control condition (C) since a preliminary analysis indicated no significant differences. Figure 1 presents the mean percent of left responses for each sex.

An analysis of variance on the data for males indicates a significant effect for Experimental conditions ($F = 5.80$, $df = 2/74$, $p < .01$) and a significant effect for Trials ($F = 7.68$, $df = 8/592$, $p < .01$), but the

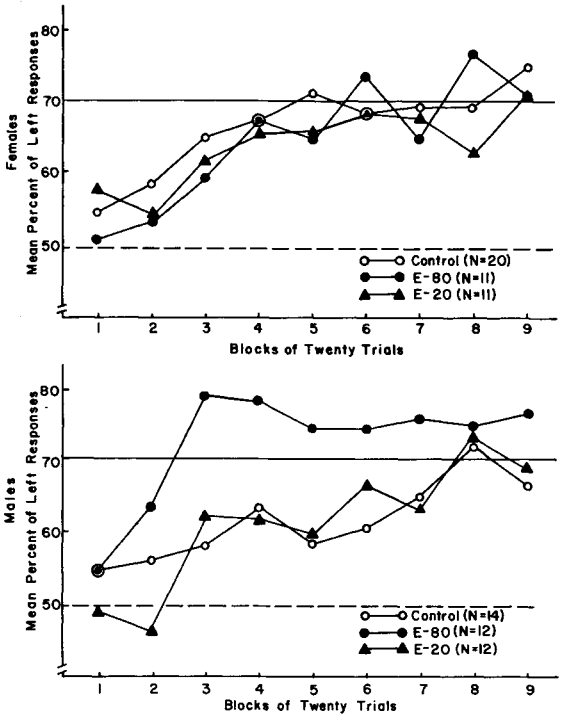

Fig. 1. Mean percent choice of the more frequently correct response (left button).

interaction of these two terms is not significant ($F = .97$). Further analysis revealed that the E-80 condition differed significantly from the E-20 condition ($t = 2.94$, $p < .01$) and from the C condition ($t = 2.93$, $p < .01$), but the E-20 and the C condition did not differ significantly ($t = 0.06$, $p > .05$).

Little difference is indicated in the performance of the females in the various experimental conditions. An analysis of variance indicates a significant effect for Trials ($F = 7.27$, $df = 8/592$, $p < .01$). The other terms are far short of significance ($F < 1.00$).

Discussion

The performance in all conditions except the male E-80 condition is similar to the results most frequently reported for the two-choice probability learning task (cf., Estes, 1964) in that Ss eventually made a response approximately the proportion of times that it was correct. In the male E-80 condition, stability of response occurs at a level above the related frequency of reinforcement. An analysis of the last 140 trials indicated that the mean level of response fails to be significantly above the 70% matching level ($t = 2.179$, $df = 11$; $t_{.05} = 2.201$) by a trifling amount.

The difference obtained between the E-20 and E-80 groups parallels the results found by Rosenbaum and his associates in the sense that, in those studies and the present one, knowledge of another's high competence was associated with a higher level of response for the more frequently correct choice. In both situations this has the effect of increasing S's accuracy, thus reducing the accuracy discrepancy between the competent other and the S. Of course, in the imitation procedure the S could observe the response of the other, suggesting interpretations of the imitation results not applicable to the present data.

Here it is suggested that knowlege of another's high competence will increase S's motivation to attain a similar early success for himself. If competition is thereby aroused, knowledge of the other's success makes each mistake more costly, a situation which has been found to lead to overmatching. Goodnow (1955), for instance, found that Ss overmatched if they won money when correct and lost when incorrect. Wycoff & Sidowski (1955) found that Ss overmatched when success on a motor task (tracking) was contingent on making a correct choice of one of two starting points. Results of the present experiment fit into this pattern; when the consequences of choice are emphasized, a higher degree of responding with the more frequently correct alternative will be obtained.

Since the performance of the E-20 group was essentially similar to the control group, S's motivation is apparently not reduced when he knows another S is performing more poorly than he is.

For female Ss, knowledge of another's competence did not affect responding in the task used here. The performance curves for E-20, E-80, and control groups were essentially identical. The unwillingness of females to compete has been noted by others (e.g., Vinacke, 1959; Bond & Vinacke, 1961). This suggests that knowledge that another is performing competently may not increase the value of success for females.

References

Bond, J. R., & Vinacke, W. E. Coalitions in mixed-sex triads. *Sociometry*, 1961, 24, 61-75.

Estes, W. K. Probability learning. In A. W. Melton (Ed.), *Categories of human learning*. New York: Academic Press, 1964. Pp. 89-128.

Goodnow, Jacqueline J. Determinants of choice-distribution in two-choice situations. *Amer. J. Psychol.*, 1955, 68, 106-116.

Rosenbaum, M. E., Chalmers, D. K., & Horne, W. C. Effects of success and failure and the competence of the model on the acquisition and reversal of matching behavior. *J. Psychol.*, 1962, 54, 251-258.

Rosenbaum, M. E., & Tucker, I. F. The competence of the model and the learning of imitation and nonimitation. *J. exp. Psychol.*, 1962, 63, 183-190.

Vinacke, W. E. Sex roles in a three-person game. *Sociometry*, 1959, 22, 343-360.

Wycoff, L. B., & Sidowski, J. B. Probability discrimination in a motor task. *J. exp. Psychol.*, 1955, 50, 225-231.

Notes

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