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The resolution of approach-avoidance conflict: II. Continuous response measures

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The resolution rule from the two-gradient model of approach-avoidance conflict was extended to situations requiring a continuous response measure. College students recommended whether or not someone should bet on each position in problems representing nine different types of approach-avoidance conflicts. The recommendations ranged continuously from +50 to −50. The results showed that the strength of the students' responses at each point in a conflict was proportional to the net strength of the competing tendencies at that point.

A recent series of investigations (Yelen, 1979) led to the development of a two-gradient model that accounts for behavior in nine different types of approach-avoidance conflicts. The two gradients in the model refer to independent tendencies of approaching and avoiding goals that generalize along either spatial or similarity dimensions. The model assumes that the approach and avoidance tendencies can be represented with probabilities, and that the heights and slopes of the gradients can be independently manipulated to produce nine different types of conflict. The model's rule for the resolution of conflicts states that, when incompatible tendencies are simultaneously aroused, the one with the dominant net strength will occur. Net strength is defined by the formula Z(app) − Z(avoid), where Z is a modified version of the normal integral of the probability representing the tendencies to approach and to avoid.

In Yelen's series of experiments (1979), the resolution rule was applied to conflict situations that required a single choice response. Under these conditions, the resolution rule predicted that subjects would move toward or choose the alternative associated with the dominant net strength.

The present experiment applied the resolution rule to conflict situations in which a continuous response measure was required. That is, instead of requiring a single choice from a number of alternatives, the present study measured the strength of the response at different positions in the conflict (cf. Brown, 1948). It was expected, following Anderson (1962) and Miller (1959), that the strength of the response at each point in the conflict would be proportional to the net strength of the tendencies at those points.

METHOD

Materials

As in previous experiments (Yelen, 1979), the different types of approach-avoidance conflicts were represented with betting problems. Approach was identified with a tendency to bet, and avoidance with a tendency not to bet. These tendencies were defined, in turn, by the expected number of points to be won and lost at each position in the problem. Each problem consisted of a column of five squares labeled at the top to indicate that one point could be won and one point could be lost. Probabilities for the occurrence of these outcomes were listed along the sides of each square. Gradients in the tendencies to bet and not to bet were established by progressively increasing the probabilities from the bottom to the top square in the column.

Nine different betting problems were constructed, one for each of the different types of conflict. The first set of three problems represented conflicts for which the avoidance gradient was steeper than the approach gradient, and the relative heights of the gradients varied: In Problem 1, approach was always higher than avoidance; in Problem 2, the gradients intersected in a way that made their heights equal on the average; and in Problem 3, avoidance was always higher than approach. For the actual probabilities used in these three problems, see Yelen (1979) Experiment V.

The second set of problems represented conflicts for which the approach and avoidance gradients were parallel to one another. The first problem in this set, with approach higher than avoidance, was characterized by a .40, .55, .70, .85, and 1.00 progression of winning probabilities, and by a .00, .15, .30, .45, and .60 progression of losing probabilities. The next problem in this set, with gradients of equal height, used the same probabilities for both the winning and losing progressions: .20, .35, .50, .65, and .80. The third problem in this set, for which avoidance was higher than approach, had winning and losing progressions of probabilities that were the reverse of those used in the first problem in this set.

The final set of three problems represented conflicts for which the approach gradient was steeper than the avoidance gradient, and the relative heights of the gradients varied: In the first problem in the set, approach was always higher than avoidance; in the next problem in this set, the gradients intersected and thus were of equal height on the average; and in the last problem in this set, avoidance was always higher than approach. For a detailed description of the problems in this set, see Yelen (1979) Experiment V.

Test booklets were used to present the materials to students. The five squares in each of the nine test problems described above as well as the five squares from three filler problems were separated and arranged randomly over the pages of these booklets. The squares were separated in order to eliminate context effects (i.e., the effects produced by the progressive changes in the probabilities of winning and losing on the judgments the students were required to make). Each individual square was labeled at the top to indicate that one point could be won and that one point could be lost. Numbers at the left and right sides of each square indicated the probabilities that these outcomes would occur. Each booklet consisted of two pages, with 30 squares appearing on each page. The order of the pages was reversed in half of the booklets.

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Procedure

Instructions were read to students indicating that their task was to study the outcomes and probabilities that were associated with each square in the booklet and then to recommend whether or not someone should bet on the square. The students were to place a plus (+) sign in the square if they recommended betting and a minus (−) sign if their recommendation was not to bet. The students were then to indicate the strength of their recommendations by writing a number between 0 and 50 below the square. An example where betting or not betting made no difference because there was nothing to win and nothing to lose was used to illustrate the weakest recommendation, 0, that could be made. Two examples, one in which there was every chance of winning and no chance of losing, and the other in which there was no chance of winning and every chance of losing, were used to illustrate the strongest recommendation, 50, that could be made.

The students' responses to each square, then, could range continuously from a high of +50, the strongest recommendation to bet, through 0 to a low of −50, the strongest recommendation not to bet.

Subjects

A group of 39 introductory psychology students served as subjects; 20 were female and 19 were male.

RESULTS

Figure 1 graphically presents the net strength of the competing tendencies and the students' betting recommendations at each point in the problems representing the different types of approach-avoidance conflicts. Net strength, labeled NS, for each square in a problem is plotted against the left ordinate, and the mean of the students' betting recommendations, labeled R, are plotted against the right ordinate. Net strength was calculated using the formula Z(app) − Z(avoid), where Z(app) was a modified version of the normal integral of the probability of winning, while Z(avoid) was the analogous score for the probability of losing. The Z scores were modified by assuming that a Z score of −2.50 and +2.50 corresponded to the probabilities 0 and 1, respectively, and then by adding 2.5 to each score to eliminate negative signs. Thus, the modified Z scores ranged from 0 to 5.

The different types of approach-avoidance conflicts that are presented in Figure 1 can be identified by the insets in each graph. The insets show the gradients for the tendency to bet, solid line, and the tendency not to bet, dashed line, found in each problem. Inspection of the insets indicates that the graphs are arranged so that the columns in Figure 1 represent differences in the relative heights of the competing gradients, and the rows in this figure represent differences in the relative steepness of the competing gradients.

The top row of graphs in Figure 1 presents the curves in the three problems for which the gradient for the tendency not to bet is steeper than the gradient for the tendency to bet. Inspection of the net strength curves in this row of graphs results in the following predictions. The

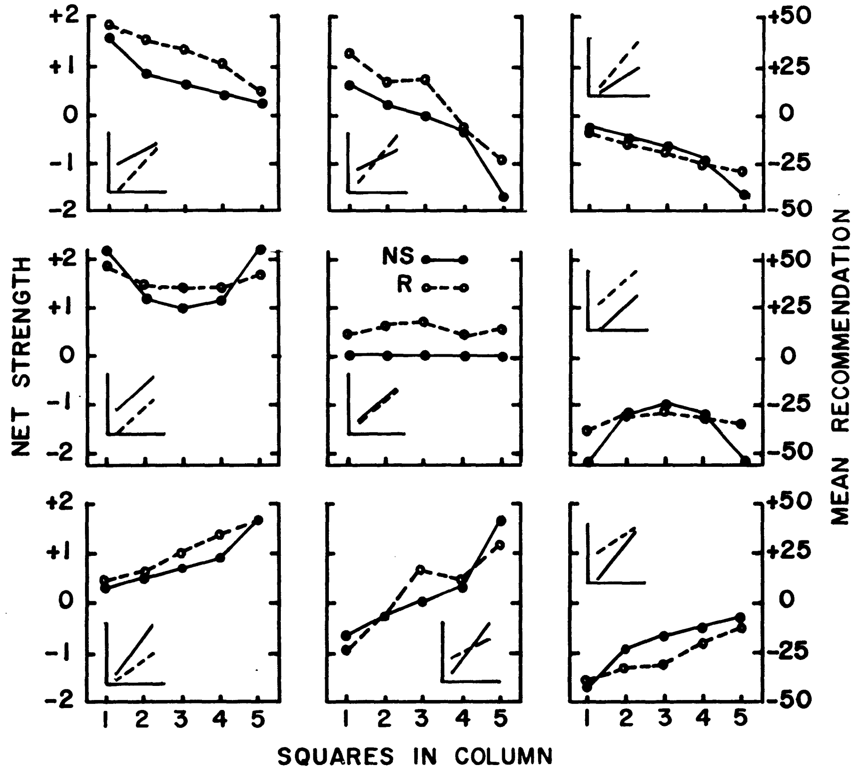

Figure 1. Net strength and the strength-of-betting recommendations for each square in problems representing different types of approach-avoidance conflicts. The insets in each graph identify the type of conflict, with a solid line for betting and a dashed line for not betting.

overall strength of the students' recommendations should decrease as the relative height of the gradient for the tendency to bet decreases over the three problems. In addition, the strength of the students' responses should decrease from Square 1 to Square 5 in all three problems, with the fastest rate of decrease occurring in the problem where the gradients intersect. Inspection of the recommendations made by the students in these problems indicates that they conformed to all of the predictions. That is, the overall mean recommendations decreased over problems; the recommendations also decreased within each problem, with the rate of decrease being greatest in the problem where the gradients intersect. These observations are supported by the results of a 3 (relative heights of the gradients) × 5 (squares within a column), repeated measures ANOVA. In this analysis, both of the main effects and the interaction were significant [$F(2,76) = 355.11$, $p < .01$ for relative heights, $F(4,152) = 177.36$, $p < .01$ for squares, and $F(8,304) = 8.39$, $p < .01$ for the interaction].

The middle row of graphs in Figure 1 present the curves in the three problems for which the competing gradients are parallel to one another. The net strength values in this row of graphs predict that both the height and the shape of the students' response curves will depend on the relative height of the competing gradients: A high U-shaped curve, a flat curve at an intermediate level, and a low inverted U-shaped curve are expected when the height of the gradient for the tendency to bet changes from greater than, to equal to, to less than the height of the gradient for the tendency not to bet over the three problems. Examinations of the students' recommendations in these problems indicate that they vary in the expected manner, and thus, support the predictions based on net strength values. Statistical support for the predictions comes in part from the results of a 3 × 5 repeated measures ANOVA. In this analysis, the main effect of the relative height of the gradients [$F(2,76) = 277.87$, $p < .01$] and the interaction of the relative heights of the gradients with the position of the squares in the column [$F(8,304) = 5.68$, $p < .01$] were both significant, and thus, indicate that the overall height of the response curves decreased over problems and that their shape varied from problem to problem. Subsequent analysis of the simple effects and Newman-Keuls Q tests indicated that the shape of the response curve in each problem corresponded to the shape that was predicted by the net strength values in the problem. In the problem where a U-shaped curve was predicted, it was found that the mean recommendations for Squares 1 and 5 were both significantly ($p < .01$) higher than the mean recommendation for Square 3. When a flat curve was predicted, all the differences between the mean recommendations were found to be nonsignificant ($p > .05$). In the problem for which an inverted U-shaped curve was expected, it was found that the mean recommendation to bet on Square 1 was significantly ($p < .05$) lower than the mean for Square 3, and that while the mean recommendation for Square 5 was less than the mean for Square 3, the difference did not reach the .05 level of significance.

The bottom row of graphs in Figure 1 presents the curves for the three problems for which the gradient for the tendency to bet is steeper than the gradient for the tendency not to bet. The net strength curves found in this row of graphs lead to the following predictions: The overall level of the students' recommendations should decrease as the relative height of the gradient for the tendency to bet decreases over the three problems; and the strength of the recommendations should increase from Square 1 to Square 5 in all three problems, with the greatest rate of increase occurring in the problem where the gradients intersect. Examination of the students' mean recommendations indicates that they conform to all of the predictions. That is, the overall height of the response curves decreased from problem to problem, and the recommendations within each problem increased from Square 1 to Square 5, with the greatest rate of increase in the problem where the gradients intersect. The results of a 3 (relative heights of the gradients) × 5 (squares within a column) repeated measures ANOVA supported these observations. Both of the main effects and the interaction were significant [$F(2,76) = 232.82$, $p < .01$ for the relative height of the gradients, $F(4,152) = 82.11$, $p < .01$ for the squares in the column, and $F(8,304) = 5.84$, $p < .01$ for the interaction].

The overall results of this experiment indicate that the strength of a continuous response at each point in a conflict is proportional to the net strength of the competing tendencies at those points.

DISCUSSION

The resolution rule from the two-gradient conflict model states that, when incompatible tendencies are simultaneously aroused, the one with the dominant net strength will occur. When aspects of the conflict situation restrict behavior to choice responses, as was the case in Yelen (1979), the rule predicts that the subjects will move toward or choose the alternative associated with the dominant net strength. When a continuous response measure is required, as in the present experiment, the rule predicts that the strongest response will occur at the point associated with the dominant net strength. A comparison of the results from problems used by Yelen (1979) Experiment V with the results from the same problems used in the present study indicates, furthermore, that conflict resolutions using different response measures are compatible or consistent with one another. That is, the alternatives that were chosen by students in Yelen's Experiment V were the alternatives that received the strongest betting recommendations in the present experiment.

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