

Probability learning as related to the response format used¹

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One-hundred and 20 Ss were randomly assigned to one of 12 forms of an "investment simulation." Each of the forms required 120 sequential choices, but they differed in terms of similarity to the classical binary format and the probability pattern used. Results with all 12 formats displayed the probability matching tendency, indicating that Ss may respond in this fashion even when the decision situation appears to differ from the classical binary paradigm.

Since it was originally developed by Humphreys (1939) the two-choice uncertain outcome paradigm has been popular for testing hypotheses concerned with statistical models of learning. The results have generally indicated that Ss' choices of the two alternatives tend to match the proportions of time that these events occur, and statistical learning theory models have been formulated to account for these results (Estes, 1950; Bush & Mosteller, 1955). A recent review of research that has been conducted using the binary paradigm is included in Kogan & Wallach (1967).

The purpose of the present study is to investigate the applicability of the general results using the binary choice format with other formats that may be perceived as allowing either less or more variability in response choice. This study represents the first step in an overall research project aimed at determining the applicability of findings associated with the binary format to the more complex decision-making requirements of management decision simulations, such as the prototype Top Management Decision Simulation developed by the American Management Association (Ricciardi, 1957). Conversely, it is hoped that the results of studies in this area will help identify possible uses of management decision simulation in developing and testing learning theories.

Method. The Ss were 120 undergraduates enrolled in three sections of quantitative methods course and randomly distributed into 12 groups of 10 Ss each. The "decision simulation" used was assembled as an 8 in. x 4 in. booklet requiring a total of 120 sequential choices. The first page presented the general instructions and the response space for the first choice, while each succeeding page reported the result associated with the preceding choice and presented the response space for the next choice. One of four decision formats was used with each S, and the instructions differed somewhat according to the format used. For Format a, for example, the instructions on the first page of the booklet were:

Your objective during this simulation is to maximize your total assets. You begin with \$50,000 available for investment and you will be given a number of opportunities to invest \$1,000 in either "A" or "B." Any one investment must be designated for just one of these two alternatives, but you may switch from one alternative to the other in separate decisions. If your decision is not correct, you lose \$1,000. Overall, the probability of success may favor either investment "A" or "B," and may or may not shift during the simulation. Each time you turn the page in this simulation booklet you'll be supplied with the outcome of the preceding investment opportunity and be asked for your decision regarding the next investment. Indicate now your decision for the first investment opportunity.

- Invest \$1,000 in A
- or
- Invest \$1,000 in B

The response forms used in the booklets representing the other three decision formats were:

- b Invest \$1,000
- or
- Don't Invest

- c Invest \$____,000
- or
- Don't Invest

- d Invest \$____,000 in A
- or
- Invest \$____,000 in B

In order to offset an occasional tendency toward extreme monetary strategies that was observed in a pilot study, the range of "investments" permitted in Format c and d were between \$1,000 and \$4,000, in whole thousand dollar amounts. The simulation was self-paced and was completed during a regular 50-min class session. The booklet was sealed at opposite corners, making it necessary to tear off each page at the bottom corner before proceeding to the next choice.

As indicated by the description above, only Format a closely resembles the essential features of the classical binary format. Format b might be perceived as being more restrictive, since the "don't invest" may be perceived as the withholding of a choice, while Formats c and d offer a variable-choice opportunity, and the "don't invest" might be perceived as one of several possible choices.

In addition to the four types of decision formats used, the decision forms also differed in the objective probabilities associated with success (or "A"), and some of them included a shift in probabilities at the 61st of the 120 choices. Thus each type of decision format was used with a .30-.70, .70-.30, and 50-.50 probability pattern, resulting in a total of 12 forms of the simulation in terms of all possible combinations of the four formats and three

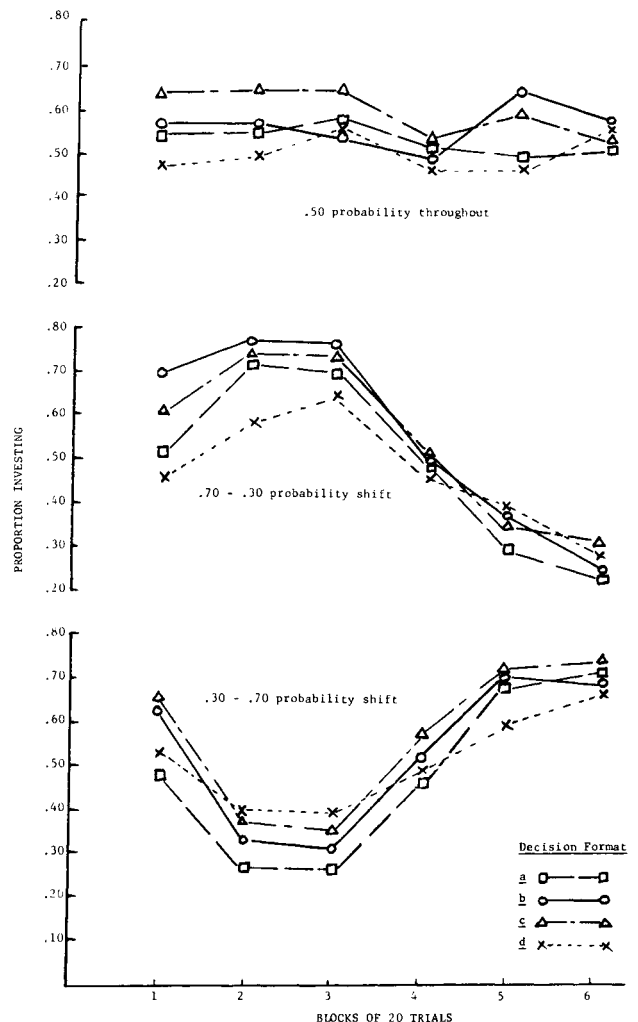


Fig. 1. Proportion of positive "invest" responses as a function of the decision format used and objective probabilities.

probability patterns. Each of these forms was randomly distributed to 10 of the 120 Ss.

Results and Discussion. In order to facilitate comparison among the four decision formats, the proportion of positive investment decisions associated with each of the formats is presented on a common graph in Fig. 1. On the other hand, to distinguish effects due to the probability pattern used, separate graphs are presented for each pattern. Inspection of the graphs indicates some fairly consistent differences in results among the formats used. For example, Formats b and c are typically highest, that is, there is a consistent bias toward the positive "invest" decision as compared to the objective probability of investment success. Also, Format d seems more resistant to change as probabilities are shifted. But these differences are small compared to the overall probability matching tendency that is exhibited for all of the decision formats used in this experiment.

The results indicate that when Ss are given the choice of investing various amounts in an opportunity vs investing nothing in it, they first respond in a binary fashion to the question of whether or not to invest before deciding on the investment amount, at least within the range of choices presented in this experiment. Accordingly, the decisions made in the context

of a management simulation may not be as different from a simple binary paradigm as has been supposed. Further research that includes a greater range of decision choices as well as the kind of decision-associated information typical of the management simulation technique is needed to continue this overall study of the relationship between the binary paradigm and management simulation.

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NOTE

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