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ABSTRACT

Researchers have suggested two models of risk preference to account for subjects' preference for tasks of moderate difficulty. The affective model proposes that pride of success and shame of failure are responsible for the observed preference. The cognitive model suggests preference for tasks of moderate difficulty because they are the most diagnostic of the subject's ability. In an experiment providing both trial success and failure feedback, undergraduate students (N=60) completed math problems on an Apple computer, a measure of achievement motivation, and a post-experimental questionnaire asking if subjects believed they had been deceived and if so, how. Data analyses indicated that subjects preferred moderately difficult tasks without preferring more diagnositc tasks. These results failed to replicate earlier research which indicated that diagnosticity influences choice of task. A dynamic theory of achievement motivation was supported. (Author/AG)

RISK PREFERENCE AND DIAGNOSTICITY

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Paper presented at the Annual Meeting of the Southwest Psychological Association, Dallas, TX, April 15-17, 1982

Risk Preference and Diagnosticity

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Two models of risk preference have been suggested to account for subjects' preference for tasks of moderate difficulty. The affective model proposes that the pride of success and shame of failure are responsible for the observed preference, while the cognitive model suggests that tasks of moderate difficulty are preferred because they are the most diagnostic of the subject's ability. In an experiment providing trial by trial success and failure feedback, subjects preferred moderately difficult tasks (although showing a predicted trend to more difficult tasks later in the session), without preferring more diagnostic tasks.

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In selecting a task to perform, people may base their choice on any number of attributes of the tasks available to them. For example, people might choose the most challenging task, the one with the highest pay off, the most socially desirable, or the most novel. For the subset of tasks which can be mastered through the application of effort (i.e. achievement tasks) two characteristics have been hypothesized to be particularly important.

Atkinson and his associates (Atkinson, 1957; Atkinson & Feather, 1966) in the classic theory of achievement motivation have singled out task difficulty, or the probability of success, as the determinant of risk preference. They describe two types of people, those for whom the motive to aproach success out-weighs the motive to avoid failure (positively motivated people) and those for whom the balance favors the motive to avoid failure (negatively motivated people). Positively motivated people, according to this theory, prefer tasks of moderate difficulty. Negatively motivated people, on the other hand, would rather not perform any achievement task, but if they

are induced to engage in such tasks will prefer very easy and very difficult tasks to those of moderate difficulty. A large body of experimental evidence (reviewed in Atkinson & Birch, 1978 and Weiner, 1972) has demonstrated that positively motivated subjects do indeed show a preference for tasks of intermediate difficulty. The evidence concerning negatively motivated subjects is considerably more ambiguous (Meyer, Folkes, & Weiner, 1976).

Recently, the theory of achievement motivation has taken a dynamic approach (Atkinson & Birch, 1970; Kuhl & Blankenship, 1979a; Revelle & Michaels, 1976). Instead of making predictions about static preferences, the current version of the theory predicts the rate of change in risk preferences across time. This theory (esp. Kuhl & Blankenship, 1979a) predicts that all people, whether positively or negatively motivated, will experience a shift in preferences toward harder tasks as the time they have worked on the tasks increases. This shift will, however, be more rapid for positively motivated subjects than for negatively motivated subjects. Further, the theory predicts that the initial preferences of positively motivated subjects will be for moderately difficult tasks, while the initial preferences of negatively motivated subjects will be for easier tasks. Kuhl and Blankenship (1979b) have

demonstrated the predicted shift toward preference for more difficult tasks and the predicted difference in original preference. The evidence for a difference in the rate of change of risk preference between positively and negatively motivated subjects was, however, weak.

In contrast, Trope (1975, 1979; Trope & Brickman, 1975) has developed the idea that one reason people attempt achievement tasks is to find to how much ability they have. Tasks differ in the amount of information they can yield about one's ability (i.e. their diagnosticity; Trope, 1975). Given only the over-all difficulty of task, one assumes that moderately difficult tasks are the most diagnostic. Neither succeeding on an easy task nor failing on a difficult task differentiates a person's ability from the ability of others. Trope has contrasted this cognitive, information-seeking formulation with what he calls the "affective" model of Atkinson and his associates. In order to independently manipulate difficulty and diagnosticity, he presents subjects with a table of norms purporting to give the performance level of students in general, students low in ability, and students high in ability. Highly diagnostic tasks are those in which the difference between the performance of students high and low in ability is large. In an experiment (Trope, 1975) which allowed subjects to choose

test items from six tests (formed by the combination of three levels of difficulty and two levels of diagnosticity), highly diagnostic tests were preferred to less diagnostic tests, and within diagnosticity, easy tests were preferred to moderate or difficult tests. In addition, the preference for highly diagnostic tests was more pronounced among subjects high in the achievement motive.

There has been a important difference in the methodology employed by the Atkinson group and Trope. Studies originating in the affective model have used trial by trial feedback designed to make the affective consequences of success and failure salient. Trope's cognitive model, on the other hand, has generated experiments in which subjects indicate which items they would like to work on, but never actually attempt any items. To the extent that this paradigm precludes responses to success and failure, it represents an unfair test of the affective model. The present experiment was designed to test the predictions derived from each model in the context of trial by trial feedback.

Method

Subjects

Sixty undergraduate students participated in the experiment in partial fulfillment of a course requirement.

It was necessary to exclude the data from 3 subjects from all analyses due to equipment failures.

Task

Each subject was tested on an Apple II micro-computer equipped with a black and white monitor. The subject attempted to keep a running total of digits which appeared one at a time in the center of the screen. In between digits either a plus or a minus sign appeared, indicating whether the subject was to add or subtract the subsequent digit from the running total. The digits and the signs were displayed for .8, 1.15, or 1.5 seconds in the hard, moderate and easy tests respectively. The time between signals was essentially zero.

Procedure

Subjects were tested up to four at a time in individual carrels. After being seated before the computer, they were told that the computer would conduct the experiment and that instructions would appear on the screen in front of them. In order to increase the credibility of the false feedback that was to be employed, subjects were told that they would be doing mental arithmetic and that the computer would tell them whether they were right or wrong. They were cautioned that it is very easy to make a mistake in mental arithmetic and not be aware of it, but that the computer never made mistakes.

Each subject then proceeded to read the instructions on the computer's screen at his or her own pace. These instructions described the task as a measure of "Mental Agility or Speed", a skill which is not well measured by conventional intelligence tests. According to the information provided to subjects, about half of all students at their institution could be considered high in this ability while the other half had low Mental Agility. The instructions went on to say that this skill is most accurately measured when students choose the type of item they want to work on, and formulas are available to correct for the difficulties chosen. For these reasons, subjects were told, the experimenter did not care which items they chose. They were then presented with the information reproduced in Table 1. This table establishes two levels of diagnosticity (tests 1, 2, and 3 vs. tests 4, 5, and 6) and three levels of difficulty (tests 1 and 4 vs. tests 2 and 5 vs. tests 3 and 6) which the instructions explicitly pointed out. After providing practice in the use of the keyboard, the actual problems began.

Before each problem, the table of norms was presented and subjects were asked to choose a group of items from which the next problem would be selected. A problem was then generated by choosing a random number between 8 and 15

to determine how many successive digits would be presented at the rate appropriate to the difficulty chosen. At the end of each problem the computer asked for the answer and then provided feedback according to a previously determined schedule. This schedule insured that within any group of four problems the probability of success shown in the table of norms would be maintained. For example, independently of what answer the subject entered, he or she was told that only one out of four answers to problems chosen from groups 3 and 6 were correct.

After completing 24 items the subject was asked to step into another room to complete "a couple of standard questionnaires that we like to have anyone who comes into the lab fill out." The first of these was the Meharabian (1968, 1969) scale which measure resultant achievement motivation. The second was a post experimental questionnaire which asked if the subject believed that he or she had been deceived and if so, how.

Results and Discussion

The level of significance chosen for all analyses was $p < .05$. Twelve subjects reported believing that the feedback they received was falsified. The mean achievement motivation score for these subjects did not differ from that

of non-suspicious subjects (t (55) = 1.81; for suspicious subjects: M = 4.25, SD = 12.73; for non-suspicious subjects: M = 15.36, (SD = 20.10), nor did the ratio of males to females ((1) < .005). The 12 subjects reporting suspicion were excluded from all further analyses, leaving 22 males and 23 females.

The major analysis suggested by the cognitive model is a 2 (high vs. low achievement motivation) X 2 (diagnosticity) X 3 (difficulty) ANOVA, treating diagnosticity and difficulty as within subjects factors, with the number of items chosen from each test as the dependent variables. Subjects were classified as high or low in achievement motive based on a median split. Because of previous findings of sex differences in the area of achievement motivation, sex of subject was also included as an independent variable. The means for this analysis are shown in Table 2. There were no significant main effects or interactions detected. These data, therefore lend no support to the information seeking model advanced by Trope.

The most appropriate analysis to test the predictions from the dynamic model of achievement motivation is one treating sex of subject and achievement motivation as between subjects factors and blocks of trials as a within subjects factor, examining difficulty chosen as the

dependent measure. The difficulty chosen was averaged for each subject within blocks of three trials. These means are shown in Table 3. ANOVA yields a significant effect only for blocks (F (7,287) = 3.70, MSe = .199). Examination of the means suggests that subjects did indeed tend to work on harder problems as time passed. There is no evidence, however that this trend differed as a function of achievement motivation.

Finally, a correlational analysis was performed. This analysis consisted of calculating a regression equation for each subject relating trials to difficulty chosen. The correlation between subjects' achievement motivation scores and their intercepts and slopes was then computed separately for males and females. Only the correlation between achievement motivation and intercept within males (r (22) = .44) differed significantly from zero. This correlation does indicate, however, that male subjects high in achievement motivation initially choose more difficult tasks.

In conclusion, these data represent a failure to replicate Trope's finding that diagnosticity influences choice of task. Of course, this experiment differs in several ways from those which have demonstrated an effect of diagnosticity. I would argue that the important difference

is that in the present experiment, subjects actually performed the tasks and therefore had an opportunity to experience the affective consequences of success and failure, but it is possible that any of a number of other changes precluded finding evidence that diagnositicity influences risk preference. The paradigm employed in this study is a slightly weaker test of the dynamic theory than might be desirable because the subjective probability of success may not have stabilized. In spite of this, the present data do support the dynamic theory of achievement motivation although, for the most part, the predictions concerning individual differences are not supported.

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Table 1

Ficticious Norms Provided to Subjects

Test	All Students	High Ability	Low Ability
1	75.03	72.90	67.10
2	50.07	54.48	45.52
3	25.11	28.44	21.56
4	75.02	90.35	49.65
5	50.10	73.66	26.34
6	25.05	45.17	4.83

Note: Due to a clerical error, the mean of the passing rates for high and low ability students is not equal to the passing rate for all students for tests 1 and 4. The single subject who noticed this was excluded from all analyses because of suspicion concerning the falsified feedback. This error is unlikely to bias the results of the experiment.

Table 2

Mean Number of Times Each Test Was Chosen

	Male		Female	
Test	Low Ach	High Ach	Low Ach	High Ach
1	3.36	3.73	2.27	3.92
2	4.45	3.55	3.82	5.33
3	4.36	4.73	4.64	2.58
4	4.55	2.73	2.91	4.08
5	3.64	4.00	5.27	4.33
6	3.64	5.27	5.09	3.75
n =	11	11	11	12

Table 3

Mean Probability of Success Chosen in Each Block of Trials

Block	Probability of Success
1	.56
2	.49
3	.49
4	.47
5	.46
6	.46
7	.47
8	.46