

## INFORMATION TO USERS

This reproduction was made from a copy of a document sent to us for microfilming. While the most advanced technology has been used to photograph and reproduce this document, the quality of the reproduction is heavily dependent upon the quality of the material submitted.

The following explanation of techniques is provided to help clarify markings or notations which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting through an image and duplicating adjacent pages to assure complete continuity.
2. When an image on the film is obliterated with a round black mark, it is an indication of either blurred copy because of movement during exposure, duplicate copy, or copyrighted materials that should not have been filmed. For blurred pages, a good image of the page can be found in the adjacent frame. If copyrighted materials were deleted, a target note will appear listing the pages in the adjacent frame.
3. When a map, drawing or chart, etc., is part of the material being photographed, a definite method of "sectioning" the material has been followed. It is customary to begin filming at the upper left hand corner of a large sheet and to continue from left to right in equal sections with small overlaps. If necessary, sectioning is continued again—beginning below the first row and continuing on until complete.
4. For illustrations that cannot be satisfactorily reproduced by xerographic means, photographic prints can be purchased at additional cost and inserted into your xerographic copy. These prints are available upon request from the Dissertations Customer Services Department.
5. Some pages in any document may have indistinct print. In all cases the best available copy has been filmed.

**University  
Microfilms  
International**

300 N. Zeeb Road  
Ann Arbor, MI 48106

PREVIEW

8227027

**Mohr, Patricia Ann**

**EFFECTS OF INITIAL LEVEL OF INTEREST, REWARD, AND TASK  
DIFFICULTY ON INTRINSIC MOTIVATION: A COMPARISON OF  
COGNITIVE EVALUATION THEORY AND OPERANT THEORY**

*The University of Nebraska - Lincoln*

**Ph.D. 1982**

**University  
Microfilms  
International** 300 N. Zeeb Road, Ann Arbor, MI 48106

**Copyright 1982**

**by**

**Mohr, Patricia Ann**

**All Rights Reserved**

PREVIEW

PREVIEW

PLEASE NOTE:

In all cases this material has been filmed in the best possible way from the available copy.  
Problems encountered with this document have been identified here with a check mark ☒.

1. Glossy photographs or pages \_\_\_\_\_
2. Colored illustrations, paper or print \_\_\_\_\_
3. Photographs with dark background \_\_\_\_\_
4. Illustrations are poor copy \_\_\_\_\_
5. Pages with black marks, not original copy \_\_\_\_\_
6. Print shows through as there is text on both sides of page \_\_\_\_\_
7. Indistinct, broken or small print on several pages ☒
8. Print exceeds margin requirements \_\_\_\_\_
9. Tightly bound copy with print lost in spine \_\_\_\_\_
10. Computer printout pages with indistinct print \_\_\_\_\_
11. Page(s) \_\_\_\_\_ lacking when material received, and not available from school or author.
12. Page(s) \_\_\_\_\_ seem to be missing in numbering only as text follows.
13. Two pages numbered \_\_\_\_\_. Text follows.
14. Curling and wrinkled pages \_\_\_\_\_
15. Other \_\_\_\_\_

University  
Microfilms  
International

PREVIEW

EFFECTS OF INITIAL LEVEL OF  
INTEREST, REWARD, AND TASK DIFFICULTY  
ON INTRINSIC MOTIVATION: A  
COMPARISON OF COGNITIVE EVALUATION  
THEORY AND OPERANT THEORY

by

Patricia A. Mohr

A DISSERTATION

Presented to the Faculty of  
The Graduate College in the University of Nebraska  
In Partial Fulfillment of Requirements  
For the Degree of Doctor of Philosophy

Major: Interdepartmental Area of  
Psychological and Cultural Studies

Under the Supervision of Professor Kenneth D. Orton

Lincoln, Nebraska

July, 1982

**TITLE**

EFFECTS OF INITIAL LEVEL OF INTEREST, REWARD AND TASK DIFFI-  
CULTY ON INTRINSIC MOTIVATION: A COMPARISON OF COGNITIVE  
EVALUATION THEORY AND OPERANT THEORY

**BY**

Patricia A. Mohr

**APPROVED**

**DATE**

Kenneth D. Orton

June 2, 1982

Robert D. Brown

June 2, 1982

Roger H. Bruning

June 2, 1982

Fred Luthans

June 2, 1982

**SUPERVISORY COMMITTEE**

**GRADUATE COLLEGE**

**UNIVERSITY OF NEBRASKA**



#### ACKNOWLEDGEMENTS

The author wishes to thank her advisor, Professor Kenneth D. Orton, for his assistance with this study. His guidance and continuing encouragement were invaluable for this research and throughout the entire graduate program.

Thanks are also due the reading committee, Professor Roger Bruning and Professor Robert Brown, who provided feedback which was helpful in completing this manuscript.

Finally, this author wishes to express her gratitude to her husband, Don, who was never too tired to listen and encourage and to her children, Danielle and Philip, for their love and patience. Without their support this research would not have been possible.

PREVIEW

# TABLE OF CONTENTS

CHAPTER		PAGE
I	INTRODUCTION . . . . .	1
	Statement of Problem . . . . .	7
	Research Questions and Hypotheses . . . . .	9
	Organization of Study . . . . .	10
II	LITERATURE REVIEW . . . . .	12
	Cognitive and Behavioral Roots of the Study of IM . . . . .	13
	Deci's Cognitive Evaluation Theory . . . . .	18
	The Definition and Measurement of IM . . . . .	20
	Attributions as Measures of IM . . . . .	22
	Problems with Self-Report Measures of IM . . . . .	25
	Present Paradigm for Study of IM . . . . .	27
	Factors Identified in Recent Studies of IM . . . . .	27
	Definition of "Reward" . . . . .	29
	Definition of "Contingent/Non- Contingent" Reward . . . . .	30
	Expectation of Reward . . . . .	31
	Saliency of Reward . . . . .	31
	Competency-Enhancing vs. Controlling Aspects of Rewards . . . . .	32
	Type of Reward . . . . .	33
	Other Factors . . . . .	34
	Rationale for Present Study . . . . .	36
	Rationale for Independent Variables . . . . .	36
	Rationale for Task . . . . .	37
	Rationale for Research Questions and Hypotheses . . . . .	37
	CET hypotheses . . . . .	40
	ACP hypothesis . . . . .	42
	OT hypotheses . . . . .	43
III	METHODOLOGY . . . . .	49
	Subjects . . . . .	49
	Task . . . . .	49
	Materials and Procedures . . . . .	51
	Dependent Variables . . . . .	55
	Design and Analyses . . . . .	57
	Design A . . . . .	57
	Design B . . . . .	57

IV	RESULTS . . . . .	59
	Analysis 1 . . . . .	59
	Relationship of Dependent Variable	
	Error for all Students . . . . .	59
	Means and Standard Deviations for	
	all Subjects . . . . .	61
	Results of Multivariate ANOVA . . . . .	61
	Analysis 2 . . . . .	68
	Combined Means for HI Cells . . . . .	70
	Results of Multivariate ANOVA	
	for HI Subjects . . . . .	70
	Ordering of High Interest (HI) Cells . . . . .	73
	Analysis 3 . . . . .	73
V	DISCUSSION AND SUMMARY . . . . .	80
	Research Questions and Results . . . . .	80
	Question A re: Relationship of Four	
	Dependent Variables . . . . .	80
	Question B re: ANOVA for all Subjects . . . . .	84
	Effects of pretreatment levels	
	of interest . . . . .	84
	Effects of reward status . . . . .	85
	Effects of task difficulty . . . . .	85
	Interaction of pretreatment	
	interest and reward . . . . .	86
	Identification of reward as	
	a reinforcer . . . . .	88
	Question C re: Comparison of Theories	
	about HI Subjects . . . . .	89
	Summary of results of analysis 2 and	
	implications for HI hypotheses . . . . .	89
	Hypotheses 3 and 3a . . . . .	91
	Hypotheses 4 and 4a . . . . .	92
	Hypotheses 5, 5a, 6, and 6a . . . . .	92
	Hypotheses 7, 7a, 8, and 8a . . . . .	94
	Hypotheses 9 . . . . .	95
	The TOA measure . . . . .	95
	Ordering of the High Interest Cells . . . . .	97
	Question D re: Effects of Reward and	
	Difficulty on LI Students . . . . .	98
	Question E re: Differences Due to	
	Pretreatment Interest . . . . .	100
	Conclusions . . . . .	102
	Limitations and Suggestions for	
	Further Research . . . . .	107
	Summary . . . . .	109
	Introduction and Literature Review . . . . .	109
	Methodology . . . . .	112
	Subjects, task, materials	
	and procedure . . . . .	112

Theoretical hypotheses . . . . .	113
Design and analyses . . . . .	115
Results and Discussion. . . . .	115
Results and hypotheses for HI students . .	115
Results and other OT hypotheses . . . . .	117
The TOA measure . . . . .	119
Conclusion . . . . .	119
REFERENCES . . . . .	121
APPENDIX A . . . . .	131
APPENDIX B . . . . .	136
APPENDIX C . . . . .	139
APPENDIX D . . . . .	144
APPENDIX E . . . . .	146

PREVIEW

# LIST OF TABLES

TABLE		PAGE
1	Hypotheses suggested by Cognitive Evaluation Theory (CET), Operant Theory (OT), and Arkes Competency Principle (ACP) for Groups of Highly Interested Students on Different Measures of Motivation . . . . .	11
2	Error Correlations of Dependent Variables for all Subjects . . . . .	60
3	Means and Standard Deviations of all Cells for all Dependent Variables . . . . .	62
4	Combined Means for Three Independent Factors for all Dependent Variables and all Subjects . . . . .	63
5	Results of Multivariate ANOVA for all Students . . . . .	64
6	Error Correlations of Dependent Variables for High Interest Subjects . . . . .	69
7	Combined Means for Two Independent Factors and all Dependent Variables for High Interest Subjects Only . . . . .	71
8	Results of Multivariate ANOVA for High Interest Subjects . . . . .	72
9	Actual Ordering of High Interest Cells on Measures of Motivation Compared to Operant Theory and Cognitive Evaluation Theory Predictions . . . . .	74
10	Error Correlations of Dependent Variables for Low Interest Students Only . . . . .	75
11	Combined Means for Two Independent Factors and all Dependent Variables for Low Interest Students Only . . . . .	77
12	Multivariate ANOVA for Low Interest Students . . . . .	78

## LIST OF FIGURES

Figure		Page
1	Design for Independent Factors for Analysis 1 . . . .	56
2	Possible Interaction of Levels of Pretreatment Interest and Reward Status on Two Dependent Measures . . . . .	87

PREVIEW

## CHAPTER I

### INTRODUCTION

Among the most compelling questions about human behavior is the question of "why?" Why do people feel and behave as they do? What motivates our actions? Certainly one of the most interesting "why" questions revolves around activities that seem to be performed for no other reason than the activity itself. Edward Deci (1971) has suggested that "intrinsic motivation" is the underlying phenomenon that provokes these sorts of self-initiated activities.

The ultimate goal of education has always been the inculcation of intrinsically motivated behaviors even though the definition and measurement of this concept remains elusive. Deci's studies (1971, 1972a, 1972b, 1973, 1975, 1976) stimulated a renewed interest in the area by suggesting an operational definition for intrinsic motivation. He defined intrinsic motivation behaviorally, as voluntary engagement in a task with no incentive to do so.

Since Deci's original study in 1971, intrinsic motivation has received an increasing amount of attention by persons in education and educational-psychological research. Educators began to question methods of behavior-change traditionally used in the classroom; much confusion and controversy concerning Deci's hypotheses continues among researchers. Deci's studies, which offered a paradigm for the study of intrinsic motivation, at the same time generated even more questions about the concept. His studies are the impetus for this research.

Foremost among the hypotheses suggested by Deci is the implication that reward damages intrinsic motivation. This contention has elicited reactions from operant theorists about Deci's theoretical hypotheses and the research methodology employed in studying intrinsic motivation.

The primary hypothesis resulting from Deci's early studies (1971, 1972a, 1972b) maintains that reward has negative impact on the intrinsic motivation (IM) of subjects engaged in a highly interesting task. His most recent formulations of Cognitive Evaluation Theory (CET) (1975) modified the proposition somewhat. He later predicted that reward will have a negative impact only if its controlling aspects, as opposed to its competency aspects, are salient for the individuals. That is, if reward increases one's feelings of competency, it will also increase the probability of return to the task after the reward is removed.

Other researchers have contributed to Deci's thesis. Calder and Staw (1975) argue for a perceptual measure of IM, rather than a behavioral one, advocating the use of self-reported perceptions as indicators of IM instead of voluntary engagement in a task after the removal of the incentive. They recommend using measures of expressed willingness to return to the task or posttreatment feelings of interest or competency in order to examine whether feelings about the task changed due to reward. Condry (1977), in a recent extensive review of the studies of IM between 1971 and 1976, supported the utilization of perceptual measures. In viewing the entire context of the task as important, Condry suggests the perception of the subject is the crucial measure of IM. Only if reward is perceived as separate from the normal



task situation, as extrinsic to the task itself, will it have a negative impact on IM.

The recommendation that perceptual measures be utilized as measures of IM is not surprising considering the integral role played by attribution theory and social psychology in the development of IM hypotheses. Bem (1967) and DeCharms (1968) hypothesized an over-justification effect which results in the shifting of attributions for behavior away from interest in the activity to external factors, such as reward.

Regardless of the method of measurement of IM, the contention that reward may reduce IM is suggested. Deci (1975) further compounded the issue by considering reward and reinforcement as equivalent events, which implies that operant methods of changing behavior may in fact be destroying intrinsic motivation. As noted by Scott (1976) this implication is a distortion of reinforcement theory. Deci's methodology does include examination of the performance on the treatment task by the rewarded and unrewarded groups but only for the purpose of assuring equivalent performance across groups. If reward does not increase performance it cannot be defined as a reinforcer. Deci's studies leave unanswered the question of how a reinforcer affects IM. Consequently, this issue became a major factor in the present study in an effort to compare the views of CET and Operant Theory (OT).

How does OT view motivation? This perspective is based on the traditional methods of scientific inquiry. Only directly observable responses and stimuli are considered as valid sources of information. Thus, it is not surprising that OT has been focused on external

motivation of behavior, stimuli in the environment which affect the frequency of a response. In the past twenty-five years the external motivators of behavior have been studied in animals in the laboratory and in humans in the laboratory and the classroom (e.g., Skinner, 1950, 1953, 1968, 1969, 1974; MacMillan, 1973; Premack, 1959; Lipse and Jung, 1971; Kerlinger, 1973). The basic tenet of this theory holds that response rate can be accelerated or decelerated through selected arrangements of observable consequences. If such consequences act to increase or maintain a response then the consequences are identified as reinforcers. Consequences cannot be defined as reinforcers unless they act to increase or maintain behaviors, necessitating a post hoc analysis of effects of "reward." Even a generalized reinforcer like money, which has often been selected as a consequence in studies of motivation due to the high probability that it will be reinforcing, would not be defined as a reinforcer prior to an analysis of its effects.

Another aspect of Operant Theory deserves mention because of its relevance to CET hypotheses which are relevant for tasks that are highly interesting to the subjects. Operant Theory acknowledges the importance of the reinforcement history of the individual. The amount and type of reinforcement and/or punishment on previous, similar occasions, whether inherent to the task or contrived, will impact on later learning. The success or failure in previous encounters with the task plays an important role in determining the impact of any stimuli in a current task. Despite this acknowledgement, the vast majority of operant research has focused on the value of external reinforcement on increasing current performance. In fact, the role of performance is

viewed as so powerful that Skinner (1969) suggests that high performance will be accompanied by feelings of interest and competency for that or a similar task.

The more pragmatic applications of motivation through reinforcement as viewed by OT are myriad in education (e.g., Ulrich, Stachnik, Mabey, 1966). Behavior modification is widely used in school systems as one means of improving student performance in the classroom. Students are offered a wide variety of incentives, from grades to gold stars to food as rewards for certain behaviors. As a short term goal, improvement in current desirable behavior is naturally of great interest, but what of long term goals? Will use of OT to improve performance today have negative effects on later motivation?

Maehr (1976) integrates these educational concerns and the current utilization of Operant Theory in the classroom with the outcomes of much of the literature on IM. He contends that education must be focused on performance outside the classroom, that the learning of information and skills is desirable because of the need for their utilization outside the confines of the academic environment. According to Maehr, this kind of learning may not be directly dependent on any particular academic environment, but might instead rest within the individual. This type of IM is defined as the tendency to return to and continue working on tasks away from the instructional context in which they were originally confronted and termed "continuing motivation" by Maehr.

All of these authors have made substantial contributions to the body of literature on IM. This literature, and the response of researchers

and educators in general to it, are compelling for three reasons. First, academicians who have become aware of the work on IM may jettison operant methods such as behavior modification from fear of negative impact on IM. Operant methods for changing behavior have long had a reputation among teachers of being manipulative. Any indication from research results that a reward might be damaging could receive a premature welcome and adoption in schools. Second, close examination of IM research reveals several omissions and some methodological confusion which can only be clarified through further research. In the majority of studies, the activity assigned to the subjects was a problem-solving type of task which was "assumed" to be highly interesting to all the subjects. No measures of initial interest were taken. Is it possible that reward might have different effects on subjects with different levels of initial interest? What about the effects of task difficulty? It seems likely that initial interest, task difficulty (perceived or real) and reward might interact in determining IM. Only a few studies have even considered difficulty (Arkes, 1980; Fisher, 1979). Arkes found the effects of perceived task difficulty to have such a powerful impact on feelings of competency about that fact that any any effect for reward (negative or positive) on other measures of IM was considered negligible. Intrinsic motivation for a highly interesting task appeared to be much greater when the activity was perceived as being more difficult. He formulated a competency principle for these effects hereafter referred to as Arkes Competency Principle (ACP).

Finally, the conflict between operant hypotheses and those arising from IM research, especially CET, merits further research. This

conflict has not been dealt with adequately in the literature. The distortion of operant principles by Deci appears to have resulted in a refusal by operant theorists to even address the issues. There is a need for more comprehensive and objective consideration of the methodologies, factors, and comparison of OT and CET hypotheses.

Some explanation of the next two sections of this chapter follows. The Statement of the Problem section offers a concise explanation of the conceptual origins of this study and a brief description of the methodology. The coupling of the conceptual and methodological was provided as an aid to understanding the hypotheses. Presentation of the research questions and hypotheses follows this description.

#### Statement of the Problem

The paucity of research designed to analyze the effects of initial level of interest, reward, and difficulty on different measures of motivation led to this study. Further, the goals of this study are to gain information regarding the effects of these factors on four measures of motivation. Two are perceptual measures. One is post-treatment task feelings of interest and two is posttreatment task feelings of competency. Two behavioral measures were also secured. One was time students voluntarily engaged in a similar posttreatment task and two, actual performance on the treatment task. The first three dependent measures listed above have been suggested by CET as measures of intrinsic motivation in highly interested subjects. Operant Theory, on the other hand, suggests the first two dependent variables, the perceptual measures, together with the actual task performance would

best serve as indicators of motivation with the last variable being pivotal. In other words, OT advocates would propose that the functioning of reward as a reinforcer, its ability to increase actual performance in the treatment task, is the determining factor, i.e., it determines feelings of competency and interest. If as maintained by Skinner (1969), feelings accompany performance, the three measures should be highly correlated.

A comparison of the divergent theoretical positions with an emphasis on different combinations of variables suggested an exploratory methodology. Two of the three variables, reward and difficulty, functioned as independent factors throughout the study. All of the 160 psychology students were assigned either a hard or an easy anagram task and received either a monetary reward or no reward for their performance. Amount of reward was contingent on the number of solutions. The other variable, initial level of interest in the task, was utilized as an independent factor only in the first analysis performed in which students were blocked according to their level of initial interest as measured by questionnaires administered prior to the task. In the other two analyses performed, only the identified high or low initial interest students were employed.

Other measures taken for the students were treated as dependent variables throughout the study. Posttreatment interest was assessed via a posttreatment questionnaire identical to the pretreatment questionnaire. Posttreatment competency was measured on the same task questionnaire. After the questionnaires, students were allowed a choice of several problem-solving tasks including anagrams (without reward).

Deci's suggested behavioral measure of intrinsic motivation, voluntary return to the task with no external incentives to do so was defined as the time the students voluntarily engaged in the posttreatment task anagrams. Finally, actual performance on the treatment task anagrams constituted the fourth dependent variable.

### Research Questions and Hypotheses

Several issues important to the study of motivation generally, as well as relationships suggested by the three views (CET, Operant Theory, and Arkes) are addressed in the following research questions and hypotheses:

- A. What are the relationships among the four dependent measures of motivation utilized in this study? (The two perceptual measures of motivation employed in this research were posttreatment feelings of interest and posttreatment feelings of competence. The two behavioral measures employed were voluntary engagement in the posttreatment anagrams and performance on the treatment anagrams.)

H<sub>1</sub>: Performance on the treatment task, posttreatment feelings of interest, and posttreatment feelings of competency should be highly correlated.

- B. What are the effects of varying conditions of initial level of interest, reward and task difficulty on the four dependent measures of motivation employed in the study?

H<sub>2</sub>: If reward groups have significantly higher treatment task performance, then reward acted as a reinforcer.

- C. How do Cognitive Evaluation Theory, Operant Theory, and Arkes' Competency Principle compare in predicting the effects of reward and difficulty on the four dependent measures of motivation for the high interest students?

All of the hypotheses relating to this question pertain to groups of highly interested students (H<sub>3</sub>-H<sub>9</sub>). Both OT and CET predict certain differences between groups and they agree on four of the six comparisons. However,

these theories suggest different sets of dependent measures as indicators of motivation. Table 1 demonstrates that CET and OT hypotheses both utilize two dependent variables, posttreatment feelings of interest and posttreatment feelings of competency, but differ on the third variable. It should also be noted that the last hypothesis ( $H_9$ ), a prediction suggested by Arkes' Competency Principle, collapses the groups. It is listed with the CET hypotheses since it anticipates utilization of the same dependent measures as CET.

- D. What are the effects of reward and difficulty on the four dependent measures of motivation for the low interest student?

$H_{10}$ : The posttreatment feelings of interest, post-treatment feelings of competency, and performance on the treatment anagrams of the Low Interest - Reward groups should be higher than those of the Low interest - No Reward groups.

- E. Do the effects of reward and difficulty on the four dependent measures or motivation differ according to the initial level of interest of the subjects?

#### Organization of Study

The rationales for these questions and hypotheses are included in the last section (H) of Chapter II. General organization of this paper follows:

Chapter I included an introduction to the topic, statement of the problem and basic research questions and hypotheses.

Chapter II (Literature Review) contributes a brief historical evolution of the study of motivation generally, the different perspectives on intrinsic motivation, the factors and problems in studies of intrinsic motivation and, finally, a rationale for the study and the research questions and hypotheses.

Chapter III (Methodology) follows the preferred APA style of outlining methodology.

Chapter IV (Results) is organized according to the three analyses performed.

Chapter V (Discussions and Conclusions) addresses the results according to the five basic research questions and includes a conclusion and a summary.