

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

Vicarious Reinforcement of Cognitive Skill

A dissertation presented in partial
fulfilment of the requirements for the
degree of Doctor of Philosophy
in Education at Massey University

by

Mildred Sharon **Sass**

1976 (Awarded)

ABSTRACT

This study was designed to explore direct and vicarious reinforcement of cognitive skill. Cognitive skill, in this case, was defined by specific types of answering behaviour.

In developmental stages of the study, a taxonomy of educational objectives was found unsatisfactory for classifying answers given by subjects. For this reason, a classification scheme was developed for use in the present study. This scheme supplied six categories of cognitive skill. Subjects' answers were classified according to which of the six cognitive skills they represented.

Developmental work also explored a variety of types of questions (completion, multiple-choice, and open-ended) in an attempt to determine which were efficient at eliciting answers representing a variety of cognitive skills. Open-ended questions appeared most satisfactory because they allowed free manifestation of a variety of types of answers rather than predetermining the cognitive skill represented by answers, as did completion and multiple-choice items.

However, with open-ended questions, there was an accompanying difficulty of eliciting answers which represented specific categories of response so that consistent stimuli could be provided for observing subjects. Since some categories had low operant levels, a videotape was used to provide standardized and consistent stimuli for observers. The modelling situation did not permit the exploration of direct reinforcement so the emphasis of the study turned to vicarious reinforcement.

In an experimental situation, subjects (girls aged 15 to 16 years) watched a model giving "answers" which corresponded to all six categories of the classification scheme. Some of the model's "answers" were praised and others were not. Subsequent measures of the observing subjects' responses tested the effect of vicarious praise. Measures were also taken to determine the effect of

awareness of contingencies of reinforcement on subjects' responses. Furthermore, alterations in the experimental design were used to explore the effects of increased intensity and relative position of praise in the modelled sequence.

Exact probabilities were used to analyze the data where possible. However, where there was more than one degree of freedom, a chi square statistic was used to determine the significance of results.

The results showed that vicarious praise did influence the types of answers given by observing subjects. That is, the praise was an effective vicarious reinforcer. However, the order of the model's "answers" and awareness on the part of subjects were unrelated to responses given by subjects. Moreover, increased intensity and change in position of the praise did not produce greater treatment effects. Alternate methods of classifying the data were explored but not found to be more efficient than the original scheme at detecting a treatment effect. Also, an unsuccessful attempt was made to identify characteristics of subjects which affected their answering behaviour.

The results are discussed as they relate to both education and psychology, and implication for both fields are considered.

ACKNOWLEDGEMENTS

In completing this document, I am indebted to the numerous volunteers who cooperated at all stages of the investigation. Without them, the project could not have been completed.

I am also grateful to the following individuals who have given invaluable assistance in various stages of this thesis:

Prof. R.S. Adams, for his initial encouragement and continuing guidance;

Prof. C.G.N. Hill and Dr. D. McAlpine, for sound suggestions and support:

Dr. B. Ryan and Mr. E. Archer, for theoretical advice and discussions;

Mr. M. Warn, for hours of videotape;

Mr. G. Clayton and Mr. E. Graham, for remarkable patience in the arduous task of coding responses;

Mr. D. Hoffman and Encyclopaedia Britannica, for loan of the film Reflections on Time;

Dr. R.E. Sass, for untold patience, understanding, and support for so many years.

The success of this thesis is due to efforts of those mentioned above. However, I must take full credit for any shortcomings.

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LIST OF TABLES	vi
LIST OF FIGURES	ix
INTRODUCTION	1
CHAPTER	
1. Background and Related Research	4
2. Procedure - Design Development	25
3. Procedure - Experimental Design	55
4. Results	87
5. Discussion and Conclusions	129
APPENDICES	
A Short-Answer, Multiple-Choice and Oral Items Used in Developmental Work	149
B Transcript of Open-ended Questioning of One Subject	175
C Alternate Definitions of the Six Categories of the Taxonomy of Educational Objectives	185
D Original and Final Form of the Coding Schedule and Example Response Coding Used to Train Judges	189
E "Answers" as Classified Using the Taxonomy and the Coding Schedule	196
F Scripts for Videotapes and Experimental Sessions	203
G Transcript of Questioning of a Subject after Experimental Treatment	215
H Complete List of Codings for Personal and Empathetic Questions	217
I Computer Programmes and Calculations	220
BIBLIOGRAPHY	227

LIST OF TABLES

	Page
1 Summary of Research Dealing with Direct Reinforcement and Vicarious Learning	22
2 Behavioural Terms for Each Level of the Taxonomy	31
3 Examples of Short-Answer Completion Items arranged Hierachically According to the Taxonomy of Educational Objectives	32
4 Number of Correct Completion Answers at Each of the Six Levels of the Taxonomy with a Maximum Score of 4 at Each Level	35
5 Examples of Multiple-Choice Items Arranged According to their Cognitive Level of the Taxonomy of Educational Objectives	37
6 Number of Correct Multiple-Choice Answers at Each of the Six Levels of the Taxonomy with a Maximum Score of 3 at Each Level	38
7 Number of Correct Answers at Each of the Six Levels of the Taxonomy with a Maximum Score of 1 at Each Level - Short Oral Test	40
8 Number of Correct Answers at Each of the Six Levels of the Taxonomy with a Maximum Score of 2 at Each Level - Long Oral Test	40
9 Examples of Open-ended and Short-Answer Questions Asked of One Subject	43
10 Answers to Open-ended and Short-Answer Questions from One Subject, Classified According to the Taxonomy by One Judge	45
11 Percent of Total Agreement of Classifications Between Four Independent Coders	47
12 Order of Response Categories on Baseline Videotapes	62
13 Order of Response Categories on Treatment Videotapes	64
14 Long Phrases of Praise Used for Each Category of the Coding Schedule	66

LIST OF TABLES cont.

	Page
15 Baseline and Treatment Videotapes Administered to Six Volunteers	70
16 Baseline and Treatment Videotapes Randomly Assigned to Subjects	79
17 Percentage of Disagreements in Coding Involving Six Categories over Two Questions	83
18 Distribution of Baseline Response Categories	88
19 Distribution of Position in Baseline Videotape of Baseline Response Categories	91
20 Distribution of Position in Treatment Videotape of Initial Response Categories to the Personal Question	92
21 Distribution of Position in Treatment Videotape of Representative Response Categories to the Personal Question	93
22 Frequencies of Subjects Matching and Not Matching the Praised Model Response with the Initial Response Category	96
23 Chance Probability of at Least X Matches with Praised Model Response When $N=30$ and $p=.1667$	97
24 Frequencies of Subjects Matching and Not Matching the Praised Model Response using Representative Response Category	98
25 Frequency of Subjects Matching and Not Matching the Praised Model Response using Response Category to the Empathetic Question as Criterion	99
26 Chance Probability of at Least X Matches with Praised Model Response When $N=13$, $p=.1667$	100
27 Frequency of Subjects Matching and Not Matching the Category of Response Following the Praise, using Initial Response Category to the Personal Question as Criterion	102
28 Frequency of Subjects Matching and Not Matching the Praised Model Response When Employing More Intense Praise	105

LIST OF TABLES cont.

	Page
29 Frequency of Subjects Matching and Not Matching the Praised Model Response When Employing Praise at the End of the Modelled Sequence	107
30 Awareness X Matching Praised Model Response (Representative Response Category) for the Personal Question	109
31 Intensity of Praise of Aware Subjects X Matching Praised Model Response (Representative Category) for the Personal Question	110
32 Intensity of Praise X Awareness for the Personal Question	111
33 Null Hypotheses, Variables and Decisions used to Investigate the Major Hypotheses	114
34 Number of Subjects Matching and Not Matching the Praised Model Response using a (1,2,3) and (4,5) Coding	118
35 Binomial Probabilities for $N=15$, $P=.5216$	119
36 Number of Subjects Matching and Not Matching the Praised Model Response using a (1) and (2,3) and (4,5) Coding	120
37 Binomial Probabilities for $N=19$, $p=.352$	121
38 Code 0, 1, and 2 X Answering the Empathetic Question	123
39 Mover vs. Non-Mover X Answering the Empathetic Question	124
40 Code 1 or 2 X Answering the Empathetic Question	125
41 Frequency of Subjects Responding with Same and Different Response Category for Personal Question (Representative Response Category) and the Empathetic Question	126
42 Null Hypotheses, Variables and Decisions Used to Investigate the Minor Hypotheses	128

LIST OF FIGURES

FIGURE		Page
1	Conditions under which a Treatment Effect may be Detected	74
2	Power Curves for $N=18, 24, 30$	76