

THE UNIVERSITY OF MANITOBA

A COMPARISON OF THE EFFECTS OF THREE MODES OF
TRAINING STIMULI UPON GENERALIZATION
TO THE NATURAL ENVIRONMENT IN A NAMING TASK
WITH RETARDED CHILDREN

by

STEVEN J. WELCH

A THESIS

SUBMITTED TO THE FACULTY OF GRADUATE STUDIES
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF ARTS

DEPARTMENT OF PSYCHOLOGY

WINNIPEG, MANITOBA

JULY, 1979

A COMPARISON OF THE EFFECTS OF THREE MODES OF
TRAINING STIMULI UPON GENERALIZATION
TO THE NATURAL ENVIRONMENT IN A NAMING TASK
WITH RETARDED CHILDREN

BY

STEVEN JOHN WELCH

A dissertation submitted to the Faculty of Graduate Studies of
the University of Manitoba in partial fulfillment of the requirements
of the degree of

MASTER OF ARTS

© 1979

Permission has been granted to the LIBRARY OF THE UNIVER-
SITY OF MANITOBA to lend or sell copies of this dissertation, to
the NATIONAL LIBRARY OF CANADA to microfilm this
dissertation and to lend or sell copies of the film, and UNIVERSITY
MICROFILMS to publish an abstract of this dissertation.

The author reserves other publication rights, and neither the
dissertation nor extensive extracts from it may be printed or other-
wise reproduced without the author's written permission.



ACKNOWLEDGEMENTS

I would like to express my sincere appreciation to:

Dr. Joseph J. Pear, my advisor and teacher, who provided supervision and guidance;

Dr. Garry Martin and Dr. Glenn Lowther who served on my committee and gave helpful comments and advice;

Sr. Baumann, administrator of the St. Amant Centre, and Sr. Rioux, head of Riverside and 3-East, whose cooperation and assistance were invaluable;

Debby Olenick, Frances B. Ravinsky, Vivienne Rowan, and Steve Werk who conducted many interobserver reliability checks for me;

My mother, who typed several drafts of this manuscript without protesting too much.

TABLE OF CONTENTS

Chapter	Page
I. INTRODUCTION	2
II. METHOD	5
Subjects	5
Experimental Design	6
Setting and Apparatus	7
Training Stimuli	9
Reinforcers	10
Preliminary Procedures	11
Overview of General Procedures	13
Baselines	15
Classroom baseline	17
Natural environment baseline	17
Training	18
Sessions and trials	18
Procedure	19
Post-Training Test	23
Tests for Generalization	26
Dependent Variables	27
Interobserver Reliability	27
III. RESULTS	31
Results of Some Supplementary Procedures	
With Janice	41
IV. DISCUSSION	45
REFERENCES	49

TABLE OF CONTENTS cont.

Appendices	Page
APPENDIX A : Details About Bliss Symbols	58
APPENDIX B : A Description of Cottage and Ward Settings	62
APPENDIX C : Criteria for the Selection of Training Stimuli	68
APPENDIX D : Review of the Literature	70

ABSTRACT

Picture-cards, photographs, and real objects were compared in order to determine which best facilitated the generalization of newly trained naming responses to real objects found in the natural environments of four retarded children. The amount of transfer which occurred across the three stimulus modes and the rate of name acquisition for each stimulus mode was also assessed. Three of the four children displayed considerably more generalization to the real objects in the natural environment when they were trained with real objects. The fourth child displayed a high degree of generalization regardless of the training stimulus mode. The extent to which naming responses transferred from the training stimulus mode to the remaining modes was variable and unsystematic, as were name acquisition rates. Thus it appears that no particular mode clearly facilitated the acquisition of naming responses or the transfer of naming responses to other modes, but training with real objects clearly resulted in more generalization to the real objects in the children's natural environments. The results of two supplementary procedures conducted with one child suggests that: (1) testing in several environments facilitates generalization to the real objects in the natural environment when real objects are used as training stimuli, and (2) transfer from picture-cards to real objects may be accomplished by concurrently training a picture-card and the real object portrayed by the picture-card. Several exemplars may be required before the child begins to generalize from other picture-cards to the corresponding real objects.

CHAPTER I

Introduction

Many of the procedures which have been used to train articulation, autoclitics, and sentences with the mentally retarded have employed picture-cards as training stimuli (e.g., Baer & Guess, 1973; Bennett, 1974; Bennett & Ling, 1972; Costello & Bosler, 1976; Lutzker & Sherman, 1974; Martin, 1975; Powell & McReynolds, 1969; Stevens-Long & Rasmussen, 1974). Moreover, picture-naming procedures have been used extensively in language training research programs with the retarded (e.g., Biberdorf & Pear, 1977; Kircher, Pear & Martin, 1971; Olenick & Pear, (in press); Stephens, Pear, Wray, & Jackson, 1975). A question which arises from such research is whether learning to name picture-cards in the classroom enables a child to name the object represented by those picture-cards when they encounter them in their natural environment. Since the objects portrayed by picture-cards often differ somewhat from actual objects along a number of dimensions (e.g., form, color, size), they may not facilitate the transfer of responses learned in the classroom to naturally occurring stimuli. In fact, several well known investigators have stated, "We strongly discourage substituting pictures for the actual items because this decreases the authenticity of the training environment and reduces the probability that students will apply their new learning elsewhere" (Guess, Sailor, & Baer, 1976, p.4). However, no empirical

investigations have been conducted to confirm this suspicion. One investigator did compare objects, slides, and pictures and found that previously non-verbal children learned naming responses at a significantly faster rate when objects were used as training stimuli but that naming responses generalized from slides to the remaining two stimulus modes significantly better than when either of the other two modes were used (Cutting, 1973). Unfortunately, this investigator did not examine generalization from the classroom to the real objects in the natural environment.

Since picture-cards are often much more convenient to use as training stimuli than are real objects, it is unlikely that teachers in applied settings would want to discontinue the use of picture-cards unless there were considerable evidence that using real objects was more effective than using picture cards in facilitating generalization to the natural environment. Consequently, the purpose of this research was to compare several modes of training stimuli to determine which mode best facilitated the generalization of naming responses trained in the classroom to the real objects found in the natural environment. Photographs were included in the comparison since like picture-cards they would be convenient to use, but they would retain more of the stimulus dimensions characteristic of the real objects. Thus, in a sense, they were a compromise between the other two training stimulus modalities.

The importance of research on stimuli used in training extends from the fact that training procedures are of little value if the behaviors they produce fail to generalize beyond the situation in which they were trained. This research then, represents a step away from the traditional "train and hope" attitude towards generalization, and a step towards a means of actively programming for generalization, as has been advocated by Stokes and Baer (1977).

For those readers who are interested in a more comprehensive review of the literature pertaining to the generalization of verbal behavior in retarded children, refer to Appendix D.

Chapter II

Method

Subjects

Four mentally retarded children participated in this research. All were residents of the St. Amant Centre in Winnipeg.

Normand was a 9 year old boy with a diagnosis of Down's Syndrome. He was first admitted to the Centre at 1 year of age and lived in a self-contained cottage-style unit attached to the Centre. A recent developmental assessment had found him to be functioning at the 2 to 2½ year level. Normand's vocal behavior consisted primarily of single syllable imitations, a number of picture-card names, and several short phrases. (e.g., "No", "Go away", "Bye-bye, see you").

Clayton was a 6 year old boy with a diagnosis of "mental retardation and seizure disorder". He was first admitted to the Centre at 3 years of age and, like Normand, lived in a cottage-style residence. A recent developmental assessment had found him to be functioning at the 3 to 3½ year level. Clayton's vocal behavior was similar to Normand's except that he emitted no utterances longer than a single word (e.g., "Hi", "No", "Yeah").

Janice was a 14 year old girl with a diagnosis of cerebral palsy and spastic quadriplegia. She was first admitted to the Centre at 1 year of age and lived on a special ward for non-ambulatory children. A recent

developmental assessment had found her to be functioning at the 2½ to 3 year level. Janice had no vocal behavior but she could reliably imitate a pointing response with her right arm and had received limited training in Bliss-symbolic Communication (see Appendix A). However, she could not reliably name any stimuli at the beginning of the experiment.

Sherri was a 5 year old girl with a diagnosis of Down's Syndrome. She was first admitted to the Centre at 1 year of age and lived on a ward for younger children. A recent developmental assessment had found her to be functioning at the 2½ to 3 year level. Sherri's vocal behavior consisted of several single syllable imitations. However, since her voice was raspy and often inaudible, she was taught to make sign language words rather than vocal words. Sherri could not name any stimuli at the beginning of the experiment.

Experimental Design

In order to determine the relative effectiveness of each stimulus mode (i.e., picture-cards, photographs, real objects) in promoting the generalization of naming responses to objects in the natural environment, three retarded children (Normand, Clayton, and Janice) were trained with each of the three modes in a sequential fashion. The order of training was partially counterbalanced across the three children to control for possible order of presentation effects. After a child had been trained with each of the three stimulus modes, an intrasubject replication was:

conducted. Thus the basic design consisted of six successive phases per child in an A-B-C-A-B-C general format. Later, a fourth child (Sherri) entered the study. This child, who was trained with two stimulus modes only (picture-cards and real objects), served to replicate and confirm the basic findings which were obtained with the first three children. A summary of the design depicting the phases in partially counterbalanced order is presented in Table 1.

In each of the phases, five randomly selected stimuli were trained to a pre-specified criterion with one of the three stimulus modes. Tests for generalization took place at the end of each phase.

Setting and Apparatus

Training sessions and generalization tests were conducted in a small classroom within the specially designed research section of the psychology department at the St. Amant Centre. The classroom contained a single child-sized table and two chairs, an electric timer, an audio-recorder, and a one-way window. A child sat facing the experimenter.

Generalization tests were also conducted in the children's natural environments (see Appendix B for details). With Normand and Clayton, the tests were conducted in the bedroom, bathroom, and kitchen areas of their cottage. Vocal responses were recorded with an audio-recorder carried by the experimenter. With Janice and Sherri, the tests took place in the bedrooms of their respective wards. The

TABLE 1
Summary of Experimental Design

Subjects	Phases					
	I	II	III	IV	V	VI
	Training Stimuli					
Normand	O	P	C	O	P	C
Clayton	C	O	P	C	O	P
Janice	P	C	O	P	O*	C*
Sherri	O	C	O	C	-	-

O = real objects, P = photographs, C = picture-cards

* With Janice, the sequence in Phases IV, V, and VI was different from that of Phases I, II, and III in order to permit the examination of certain variables described at the end of the Results section.

experimenter and a second observer independently recorded the relevant motor responses on a data-sheet.

Training Stimuli

Three modes of training stimuli were compared in this research: (1) picture-cards, (2) objects, and (3) photographs.

Picture-cards were obtained from kits of Peabody Picture Vocabulary Cards and Peabody Articulation Cards. The experimenter and two observers independently rated a selection of 110 picture-cards according to whether or not they represented an "object" as defined by a written criterion which basically stated that a picture-card represented an object if it depicted something other than a person, animal, food item, or symbol, and if it could be easily transported into the training room by the experimenter. The 58 picture-cards so rated by the experimenter became eligible to serve as training stimuli. The inter-observer reliability coefficients (agreements divided by agreements plus disagreements for those picture-cards the experimenter selected as representing objects were .98 and 1.00 for observers 1 and 2 respectively. The coefficients for those picture-cards the experimenter rejected were .98 and .98 for observers 1 and 2 respectively.

The experimenter acquired objects which he judged to be representative of the objects portrayed by the 58 picture-cards according to a written criterion which basically said that an object was representative of it

was similar in color and form to the object portrayed by the picture-card (with differences in fine detail excluded). Those objects then became eligible to serve as training stimuli. For 18 of the picture-cards a second object was acquired which the experimenter judged to be non-representative. Two independent observers then judged the 76 objects according to the written criterion. The inter-observer reliability coefficients for those objects that the experimenter judged as being representative of the objects portrayed by the picture-cards were .98 and 1.00 for observers 1 and 2 respectively. The coefficients for those objects the experimenter judged as being non-representative were .89 and .89 for observers 1 and 2 respectively.

Standard 9 x 12 $\frac{1}{2}$ cm color photographs were made of the 58 objects. Each print depicted an object at an angle similar to the angle depicted by the picture-card. Photographs were not enlarged to picture-card size because the prohibitive cost would lessen the applied value of the training stimulus.

For further detail on the selection of training stimuli, including the written criteria referred to above, see Appendix C.

Reinforcers

Edible reinforcers for Normand, Clayton, and Sherri were chosen on the basis of: (1) the rate at which a child would press a lever in order to receive a particular reinforcer, and (2) nutritional considerations. The reinforcers:

chosen were pureed peaches (one teaspoon per reinforcement), applesauce (one teaspoon per reinforcement), and ice cream (one-half teaspoon per reinforcement) for Normand, Clayton, and Sherri respectively.

Janice was on a calorie restricted diet and consequently her reinforcer was small bites of her evening meal. After a session Janice always received that portion of her meal which had not been consumed.

Preliminary Procedures

The children were familiarized with the classroom and the experimenter before the research was conducted. During this time they were taught to sit in their chairs and disruptive behaviors were extinguished with procedures similar to those employed by Kent (1972) and Martin, England, Kaprowy, Kilgour, and Pilek (1968).

Following the selection of the 58 objects described in the section headed Training Stimuli, an imitative baseline was conducted with Normand, Clayton, and Sherri. This consisted of a series of trials during which a child was instructed to imitate the experimenter as the latter pronounced (or signed) the names of the 58 training stimuli. The actual stimuli were not present. A trial consisted of the experimenter saying, "Say (name of stimulus)!" or "Do this (sign)!" and then writing down the child's response. The list of 58 stimuli was presented to the child three times. The first time the list was presented the experimenter spoke (signed) the entire word before waiting for the child's response (e.g., "Say FORK!"). If the child could not imitate the entire word, the experimenter

broke the word up into several syllables (e.g., "Say F (child imitates), OR (child imitates), K (child imitates)!"). If the child could not pronounce a particular syllable, the experimenter accepted an approximation to the correct pronunciation (e.g., F-OR-T instead of F-OR-K). The second and third time the tests were presented, the experimenter spoke the word as it had been pronounced most clearly before. This was to ensure that the child could emit the particular imitative response reliably. During this baseline, imitative response were reinforced with primary reinforcement on a variable-ratio five schedule, while social reinforcement (e.g., "Good!") followed every imitative response. Responses were recorded on audio-tape for future reference. The purpose of the imitative baseline was to provide a criterion for determining whether or not a vocal response was correct during training (described later). This is important because the training procedure was designed to develop stimulus control over naming responses but not to shape imitation. No imitative baseline was required with Janice since her naming response was of a non-vocal nature.

Clayton and Normand had both previously participated in research programs where they had learned to emit visual observing responses to picture-card training stimuli. However, preliminary testing with Janice has revealed an apparent tendency to visually fixate on the Bliss symbols located on her tray without first observing the training stimulus presented to her by the experimenter. Consequently,

this impaired the establishment of stimulus control by the training stimulus. Basic research on the matching-to-sample behavior of pigeons has found that fewer training sessions are required to establish matching, and that matching accuracy is higher, when an explicit observing response is required to the sample stimulus (Eckerman, Lanson, & Cumming, 1968). Therefore, during a preliminary training phase where Janice was taught to name three colors displayed on picture-cards, she was prompted to touch the card for 5 seconds before pointing to a Bliss symbol. This procedure continued until she discriminated between the three randomly alternating cards with approximately 70 percent accuracy.

Finally, during this preliminary phase all three children were assessed to determine which of a variety of simple instructions they could reliably follow (e.g., "Show me your nose", "Stand up", "Sit down", "Touch your hair"). A list of instructions was presented to each child three times and any instruction correctly followed all three times was retained. Eight instructions were retained for Janice and Normand, and nine instructions were retained for Clayton. The function of these instructions will be explained in a following section.

Overview of General Procedures

At the beginning of each phase in the research, seven stimuli of the appropriate stimulus mode were randomly selected from the pool of 58 described earlier. Five of

the seven stimuli were randomly selected to serve as experimental stimuli while the remaining two served as control stimuli which were not taught but which served to estimate the degree of "training" which might be expected to result from uncontrolled sources (e.g., home, school).

In each phase of the research, four types of procedures were used. First, a baseline was conducted in both the classroom and in the child's natural environment to ensure that none of the stimuli to be used in that phase were known prior to training. In the classroom, all three stimulus modes were baselined, while in the natural environment only the real objects were baselined. Second, training took place in the classroom with one of the three stimulus modes. Third, a post-training test was conducted in the classroom with the newly trained stimuli in order to estimate the strength of the naming responses. Fourth, a test for generalization was conducted in the classroom to determine if generalization occurred to the two untrained modes, and in the natural environment to determine if generalization across settings to the real objects had occurred.

The baseline in the classroom and the baseline in the natural environment were conducted on two separate, successive week days. Training was carried out on successive week days until each stimulus was learned to a preset criterion. The post-training test, the test in the classroom, and the test in the natural environment followed training on the next three successive week days respectively.

Each of these four procedures will now be considered in more detail.

Baselines

Those aspects of the baseline procedure common to both the baseline conducted in the classroom and the baseline conducted in the natural environment will be described first.

A child was presented with a series of 14 simple instructions which he or she was known to reliably follow (see section headed Preliminary Training). A probe instruction, "What's this!" was interspersed among the 14 non-probe instructions seven times; once for each of the five experimental stimuli and once for each of the two control stimuli. Thus the entire series consisted of 21 instructions, seven of which instructed the child to name a stimulus which was presented to him or her. While the non-probe instructions varied across children, the general format of the series was constant and is depicted in Figure 1.

Social reinforcement (e.g., "Good boy!") followed every correct response to a non-probe instruction, and the astericks in the figure indicate where primary reinforcement occurred within the series. Correct responses to probe instructions, were never reinforced. Each probe and non-probe instruction followed the response to the preceding probe or non-probe instruction immediately. If no correct response occurred to the probe instruction (which was typically the case during baselines), the experimenter