THE UNIVERSITY OF MANITOBA

ADDITIONAL SETTINGS VERSUS ADDITIONAL TRAINERS AS SUFFICIENT STIMULUS EXEMPLARS FOR PROGRAMMING GENERALIZATION OF A GREETING RESPONSE OF SEVERELY RETARDED PERSONS

by

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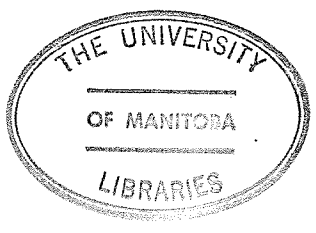

Abstract

In the developing technology of generalization relatively little attention has been paid to the effects on subsequent generalization of training sufficient stimulus exemplars. This research was designed to investigate the relative importance of training by "additional experimenters" compared to "training in additional settings". Six severely retarded participants took part in two experiments; three participants in each. Each experiment employed a multiple-baseline design across subjects. All the participants were taught to emit the simple verbal greeting, "Hi!" and this became the dependent variable in the research by means of which generalization was assessed. The first experiment investigated the effects on subsequent generalization, across settings and individuals, of training by additional trainers in a single setting. The second experiment investigated the effect on subsequent generalization, across settings and individuals, of training by one trainer across additional settings. Both the variables investigated produced widespread generalization across settings and trainers, and this generalization proved lasting over time. The research demonstrated that generalization of a simple greeting response with retarded persons can be accomplished with approximately equal facility either by programming the response to two or more trainers in one setting, or to one trainer in two or more settings.

ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

INTRODUCTION

Many early studies such as those conducted by Fuller (1949), Lindsley and Skinner (1954), and Isaacs, Thomas and Goldiamond (1960) demonstrated the applicability of operant conditioning principles and techniques in the analysis, control, and/or modification of the behavior of diverse populations. Subsequent studies have confirmed these findings. However, while many aspects of behavior may be modified by such a methodology, and though such modifications may be encouraging, a major problem gives cause for concern. As long as the newly acquired adaptive behavior, or the suppression of inappropriate behavior, does not generalize to other settings, to other people, and remain stable over time, operant conditioning programs cannot be maximally effective.

Since Baer, Wolf and Risley (1968) proposed seven dimensions that might ideally characterize analytical behavioral applications, the generality dimension has received increased attention. They suggested that, "a behavioral change may be said to have generality if it proves durable over time, if it appears in a wide variety of possible environments, or it spreads to a wide variety of related behaviors." Since their proposal, many authors (e.g., Kazdin, 1973; Martin & Pear, 1978) when discussing specific issues related to the efficacy and ethical nature of behavior modification programs, have recommended that programs should ensure generality over stimulus situations and time. In some areas of application, relatively few studies, however, test for or program generalization of the target behaviors (Keely, Shemburg & Carbonnell, 1976; O'Donnell, 1977). Moreover, as exemplified by the reviews of Stokes and Baer (1977), Wehman, Abramson and Norman (1977), and Wildman,

and Wildman (1975), a technology for actively programming generalization has appeared within the practice of applied behavior analysis during the past few years. Other reviews of strategies for programming generalization can be found in Lowther (Note 1).

Stokes and Baer (1977) reviewed 120 studies that contributed directly to "a technology of generalization" and loosely categorized articles according to nine general headings (see Appendix I). One such heading was called "train sufficient exemplars" and Stokes and Baer considered this category to be perhaps one of the most valuable areas for programming generalization. With this technique "...generalization to untrained stimulus conditions and to untrained responses is programmed by the training of sufficient exemplars (rather than all) of these stimulus conditions or responses." Although very little research concerned with generalization programming has dealt with the training of sufficient stimulus exemplars, some relevant research has been reported.

Several recent studies indicate that the introduction of even one additional experimenter who administers the training contingency greatly enhances the likelihood of subsequent stimulus generalization (Lovaas & Simmons, 1969; Kale, Kaye, Whelan & Hopkins, 1968; Stokes, Baer & Jackson, 1974). Similarly, studies by Lowther, Martin and Nicholson (1978), Walker and Buckley (1972), and Garcia (1974) indicate the importance of training in additional settings in order to increase the probability of stimulus generalization. Overall, however, these studies were not designed to investigate the relative importance of training by "additional experimenters" compared to "training in additional settings". In the studies conducted by Kale et al. (1968), and by Stokes et al. (1974), all

experimenters trained in all settings with "approximately equal frequency each day". Lyon (Note 2) and Garcia (1974), in studying generalization, talked of "separate settings" defined as "combinations of particular areas and specific experimenters present there". The study by Lovaas and Simmons (1969), which dealt with the effects of contingent shock on self-destructive behavior in retarded children, did attempt to investigate the separate and distinct effects of the introduction of additional experimenters who administered the contingent shock and the introduction of the shock contingency in additional settings. Unfortunately, in keeping with other studies reported in the literature (e.g., Fox & Martin, 1975), both procedures failed to produce generalized suppression of the self-destructive behavior. The study by Lowther et al. (1978) dealing with the effects of positive reinforcement on the sitting posture of profoundly retarded women, investigated the effects of the introduction of a contingency in different settings on the stimulus generalization of appropriate posture. They found that the application of the contingency in two settings was sufficient to produce generalization of the response to a third setting in three of four subjects.

The relative importance of the two independent variables, "additional trainers" and "training in additional settings", still requires further investigation. Will training across more than one setting, with only one trainer involved, lead to generalization of the response to new settings and trainers? Alternatively, will the use of more than one trainer within a single setting lead to generalization across both trainers and settings? Additionally, which is more efficient for programming generalization across settings and trainers; training by extra experimenters in

a single setting, or training by a single experimenter in several settings? The present study was directed at these questions.

METHOD

Participants and Settings

Six severely retarded persons, all residents of the Manitoba School were studied.

The participants were chosen on the basis of having no apparent form of verbal greeting, and no critical physical disability (e.g., blindness, deafness, etc.) Participant characteristics are shown in Table 1.

Insert Table 1 about here

They all lived in the same cottage with approximately 25 other retarded persons. Since the cottage was organized largely according to operant conditioning principles (e.g., see Martin, 1972), the participants were also involved in other behavior modification programs. None of these, however, was concerned with the development of a verbal greeting, the dependent measure of this study.

Participants were studied in four settings in their cottage; Classroom 1, Classroom 2; the Dining Room, and the T.V. Room. Classroom 1 measured approximately 3 m by 2.7 m. It contained three student desks, a table, and some straight chairs. During training sessions and generalization probe sessions, it was typically occupied solely by one participant and one experimenter. It was connected to an observation room by one-way glass, behind which inter-observer reliabilities were typically carried out.

Classroom 2 measured approximately 3 m by 2.7 m. Like Classroom 1, it contained some student desks, a table, and some straight chairs.

Table 1

Summary of Participant Characteristics

Name	Age	Diagnosis	Mental Status	Length of Stay in Manitoba School
Doug	20	Severe M.R. possible brain injury; Expressive aphasia-	Mental Age 2 years 1 month (Stanford-Binet)	11 years
Donna Gail	21	Severe M.R. Autistic	Mental Age 2 years 0 months (Stanford-Binet)	12 years 6 months
Diane	24	Severe M.R. Epilepsy	Mental Age 3 years 7 months (Stanford-Binet)	13 years
Linda	33	Severe M.R. Phenylketonuria	Mental Age 2 years 7 months (Stanford-Binet)	22 years
Phyllis	28	Severe M.R. Chromosomal abnormality	Mental Age 2 years 2 months (Stanford-Binet)	22 years
Kathy	23	Severe M.R.	Mental Age 3 years 0 months (Stanford-Binet)	8 years

However, due to overcrowding, it was, on occasion, used as an auxillary dormitory and hence contained two or three beds. Its stimulus properties were therefore different from those of Classroom 1. Typically during training or probe sessions it was occupied only by one trainer or prober and one participant. It, also, was connected to the observation room by one-way glass, behind which inter-observer reliabilities were taken.

The Dining Room was furnished with eight tables, each surrounded by four straight chairs. A serving counter, running along one side of the room, separated it from the kitchen area. The dining room was used for training or probe sessions during periods between mealtimes, and hence, at the most, only one or two dietary or cleaning staff might be present in addition to the experimenter, participant, and extra observer.

The T.V. Room was large, approximately 4.6 m by 9.1 m and was furnished with chesterfields, chairs, coffee tables, and another large table in the center of the room where staff had coffee breaks or performed various activities such as labelling clothes, sorting laundry, etc. A T.V. set occupied one corner of the room and a radio or record player were frequently in use. It was a busy and rather noisy setting typically occupied by from 15 to 30 residents and staff at any one time, including times when training or probe sessions took place.

Response Measurement

The simple verbal experssion "Hi!" was used as a common example of a useful social greeting. All responses were classified in one of three ways:

1. spontaneous response: a correct response emitted within 10 seconds of a trainer or a prober (another adult) approaching and sitting

within three feet of the participant.

2. prompted response: a correct response emitted within 10 seconds of the trainer or a prober approaching and sitting within three feet of the participant, but only after a verbal prompt by that person, e.g., "Say 'Hi!' (participant's name)."

3. incorrect response: any response, other than the greeting, "Hi!", which occurred within 10 seconds of the trainer or prober approaching and sitting within three feet of the participant.

Trainers and Probers

Trainers and probers were psychology graduate students whose major area of study was operant conditioning. They acted under the direction of the author and conducted daily training or probe sessions as required.

An Overview of the Design

Two experiments were conducted in order to analyze the necessary and sufficient stimulus exemplars, either trainers or settings, for programming generalization across both trainers and settings. In each experiment, a trainer taught the simple greeting response to a participant. Following this, several probers tested for generalization across the training and three other settings.

Experiment 1. This experiment was designed to examine the effects of training across trainers on the generalization to additional people and across settings. After baseline assessment of the greeting response, Trainer 1 taught Participant 1 to greet her in Setting 1 (Classroom 1). After the participant reached the criterion of sufficient training, a probe period was conducted by all available probers across all four settings. If the greeting response did not generalize to all probers, then a second

teacher taught the participant in the same setting. When the training criterion was reached, a second probe was carried out by all probers in all settings. This pattern of incremental additions of one more teacher in Setting 1, after each unsuccessful probe, continued until 80% of the probe contacts to all probers in Setting 1 were met by the greeting response, "Hi!"

The procedures were then replicated in a multiple-baseline design across Participants 2 and 3. In order to control for stimulus similarity or differences occasioned by the presence of different trainers, the participants were each taught by a different order of trainers.

Experiment 2. This experiment was designed to determine the effects of one teacher training in a number of settings on subsequent stimulus generalization across additional people and settings.

Trainer 1 taught Participant 4 to greet her in Setting 1. After the participant reached the criterion of sufficient training a probe period was conducted by several probers across all four settings. If generalization to all probers did not occur, then Trainer 1 commenced training in Setting 2. After Participant 4 reached the criterion of sufficient training in this second setting another probe period commenced. This pattern of incremental additions of one more training setting by Trainer 1, after each unsuccessful probe, continued until the participant spontaneously initiated the greeting "Hi!" on 80% or more of the probe contacts by all probers in Setting 1, or until the participant had been trained in all four settings. In a multiple-baseline design across subjects the other participants were then trained by one trainer sequentially across settings, in a similar manner. Each participant was

trained in a different order of settings if insufficient generalization occurred to all probers in Setting 1. For Linda, Classroom 1 was Setting 1, Classroom 2 was Setting 2, Dining Room was Setting 3, and T.V. Room was Setting 4. For Phyllis, Classroom 1 was Setting 1, Dining Room was Setting 2, T.V. Room was Setting 3, and Classroom 2 was Setting 4. For Cathy, Classroom 1 was Setting 1, Dining Room was Setting 2, Classroom 2 was Setting 3, and T.V. Room was Setting 4.

Details of the Design

Baseline procedures. In Experiment 1, the experimenter and all probers initially conducted baseline tests in all four settings to determine any existing tendency of the participants to emit a greeting response. Since all participanets were probed after each reached the training criterion in any setting, this provided a continuing baseline for each participant until she herself was trained.

In Experiment 2 the same procedure was followed, but due to the loss of one participant, Participant 6 had a baseline of only five probe days immediately prior to her training.

Training and probe contacts. Both the training of the greeting response and the probes for its resulting generalization consisted of a number of contacts with a participant. Contacts were initiated by the trainers or probers under the following conditions: (a) the participant was approached by a trainer or a prober who sat within three feet of her; (b) the participant was approached only when she was seated in the appropriate room, not when standing, walking, lying down, etc.; (c) the trainers or probers always sat within the participant's field of vision.

During training, the programmed consequences of a spontaneous or

prompted response consisted of a variety of edibles such as candy, potato chips, cookies, coke, etc., depending on the preference of the participant as reported by ward staff. In addition, the trainer responded to the greeting response with the appropriate verbal reply, "Hi!" Edibles were always accompanied by social approval such as praise and smiles, and physical contact where this was assumed to be reinforcing to the participant.

During the first few days of training, prompts were used liberally and then were gradually reduced in number. During initial training, there were no time limits governing the frequency of contacts between the participant and the trainer. Training commenced with breaks between contacts of a few seconds to a few minutes. These time intervals were gradually increased until at least a five-minute break occurred between contacts, this condition commencing on the same day that the use of prompts was discontinued. A day on which prompts were required was not included when determining if a participant had met the criterion of sufficient training.

The criterion of sufficient training was defined as: (1) three consecutive days on which the percentage of spontaneous verbal greetings to the trainer occurred on 80% or more of the unprompted contacts; (2) when there was a delay between training and subsequent contacts, such as a weekend, then one more training day at the 80% criterion was required (i.e., four days at the 80% criterion).

When this criterion was met training contacts were reduced in frequency to a maintenance schedule and probes for generalization were made.

Maintenance schedule. During probes for generalization those

trainers who had previously taught the participant continued training on a maintenance schedule. Similarly, after each participant's response had satisfactorily generalized the maintenance schedule was continued during the training of other participants. On one-fourth of the experimental days, in a randomly selected but previously trained setting, the greeting responses of previously trained participants was maintained by three to six contacts in which correct responses were followed by edibles and social approval.

Probes. A probe for generalization consisted of each prober making a number of contacts with the participants. Each day, after the training criterion was reached, a minimum of one prober, or a maximum of six probers, unsystematically sampled from the available pool of probers, made four contacts with each participant, one probe in each of the four settings per prober, and recorded the subjects' greeting responses to them. On the average three probers contacted the participants and provided an opportunity for the greeting response in all four settings. Thus, on the average, 12 probes for each participant were made each day.

Probes were conducted over at least a five-day period. Thus, each participant was probed on the average 60 times in each probe period of the study. A probe contact lasted for 10 seconds or until a greeting response was given, whichever came first. There was at least a five-minute break between successive contacts by a prober (in different settings), and there was a similar break between contacts by successive probers. The probers were instructed that for five minutes before a contact with a participant they should either remain out of the

participant's view or, if circumstances necessitated both being present in the same setting, that they should remain at least 15 yards from the participant for five minutes preceeding the contact. If the participant was not in the desired setting and seated when a prober arrived to make a contact then one of two actions was followed, depending on the circumstances; (a) if the participant was present in another setting, awake, and not engaged in a meaningful activity (e.g., training sessions, watching a favorite T.V. program, etc.) the help of a cottage staff member not engaged in the study was requested to escort her to the desired setting, while the prober remained out of the participant's view; or (b) if the participant was asleep or engaged in a meaningful activity, the prober left the vicinity and returned at a more suitable time.

If, during a contact, the spontaneous greeting response, "Hi!", was emitted, it was consequated by the rejoinder, "Hello", a smile, and physical contact (when the latter was assumed to be reinforcing to the participant). If the participant did not emit the desired response, "Hi!", to the prober's approach within 10 seconds, the prober withdrew from the participant's immediate vicinity. No prompts were given during these generalization contacts. If the participant walked away from the prober before emitting the greeting, she was not followed; the prober remained seated, facing in the same direction until 10 seconds passed. If the participant returned within 10 seconds and gave the verbal greeting, then this was counted as a spontaneous response and properly consequated. If the participant did not return within 10 seconds, an incorrect response was recorded.

Probe contacts occurred daily with the exception of weekends or

occasions when a participant went home for visits or was reported sick. Probe contacts were made throughout the day during the normal activities of the cottage. Each prober made some contacts in the morning and some in the afternoon.

Since, at various times throughout the day, a prober might approach a participant during a normal part of the cottage routine that was not a scheduled probe contact, greeting responses that occurred at such times were met with a smile and "Hello" but were not recorded.

Inter-Observer Reliabilities (IOR)

A response was scored as an agreement if the trainer and an additional observer (another graduate student) independently considered that the participant correctly articulated the expression "Hi!" during a probe contact or during training. On some occasions, when only one experimenter could be present to observe the response, a tape recorder was used and the tape subsequently scored by another experimenter. IORs were conducted at least once during each probe period.

IORs were calculated by dividing the agreements by the sum of the agreements plus disagreements, and multiplying the quotient by 100.

RESULTS

Experiment 1

Participants 1 and 2 each required training by two trainers in Setting 1 to reach and exceed the 80% generalization criterion to all probers in Setting 1 (see Figure 1). However, when this criterion was

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Insert Figure 1 about here

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reached, each showed an almost equal amount of generalization to all probers in the three other settings. Participant 3 reached 75% generalization to all probers in Setting 1 after training by two teachers, but less generalization occurred to all probers in the other three settings. She required a further three teachers, five in all, to reach and exceed the 80% generalization criterion to all probers in Setting 1. At this point an almost equal amount of generalization occurred to all probers in the other settings where no training had taken place (see Figure 1).

Inter-observer reliabilities were 100% throughout the experiment.

Experiment 2

Participant 4 was trained in four settings by Trainer 1 before she had reached 80% generalization criterion to all probers in Setting 1 (see Figure 2). At exactly the same point in time her spontaneous greetings

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Insert Figure 2 about here

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increased in the other three settings to all probers, and she maintained almost 100% generalization in all settings for the remainder of the study.

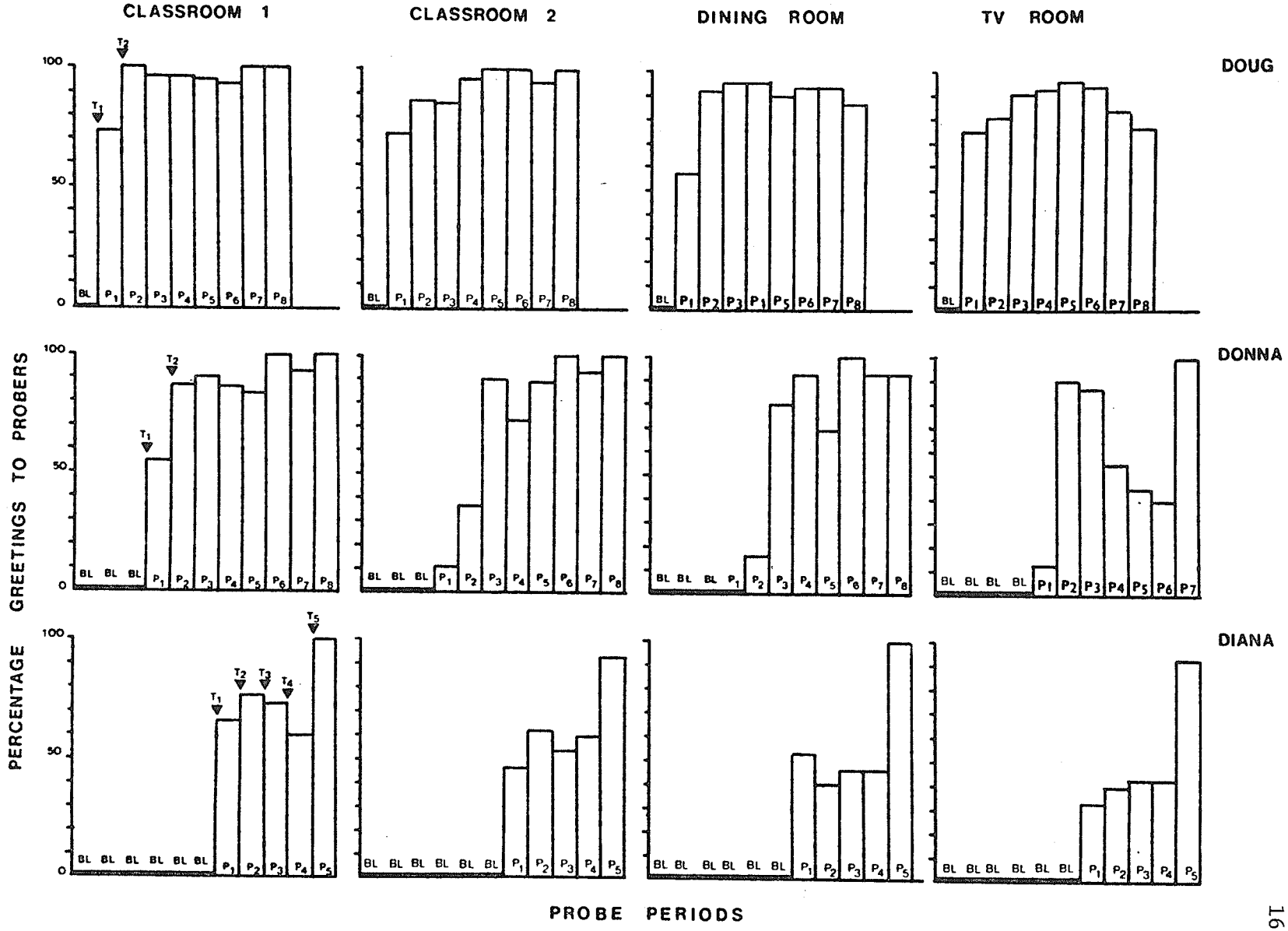

Figure 1. Percentage of spontaneous greetings, over settings and probers, to probe contacts in Experiment 1.

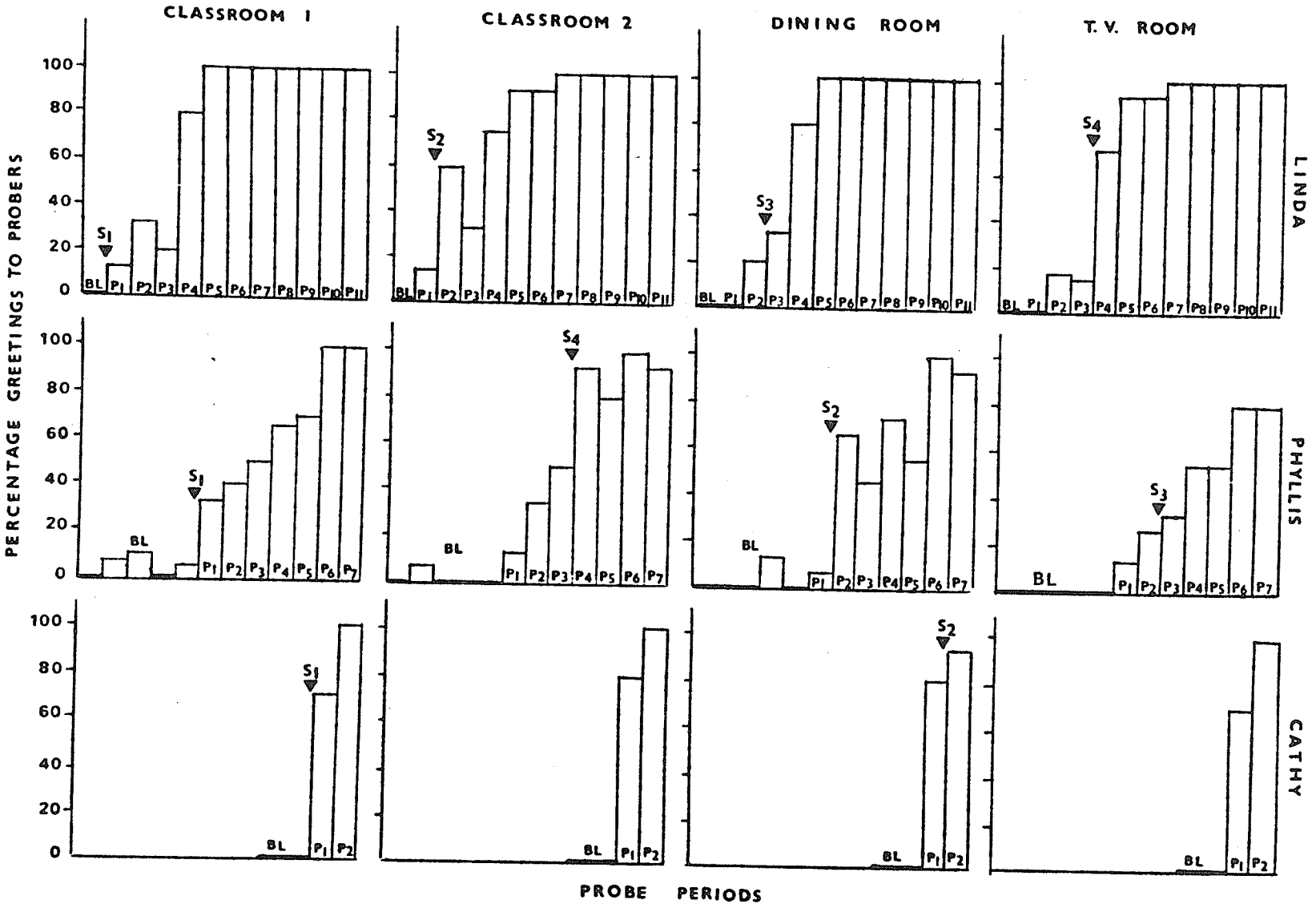

Figure 2. Percentage of spontaneous greetings, over settings and probers, to probe contacts in Experiment 2.

Participant 5 was also trained in four settings by Trainer 1. At that point she fell slightly short of the 80% criterion to all probers in Setting 1 but exceeded it in one other setting (where the last training period took place). Probes were continued with her, without further training, and two probe periods later she was initiating the greeting response consistently to all probers in all settings.

Participant 6 was trained in two settings before reaching the 80% generalization criterion to all probers, and from then on she continued to emit the greeting response across probers and settings (see Figure 2).

Inter-observer reliabilities were 100% throughout the experiment.

In both experiments, age, diagnosis, and I.Q. seemed to have little bearing on the results.

DISCUSSION

Both the variables investigated, training by more than one trainer in one setting, and training by one trainer in additional settings, produced widespread generalization to a variety of probers and settings, and this generalization proved lasting over time. Due to the time-consuming nature of the experiments, probers changed several times throughout the study, and there were breaks of many weeks when no probes could be made. Neither the introduction of new probers nor the passage of time seemed to weaken the response once it was established. In Experiment 1, probes continued to occur, after subjects reached criterion, for 7½ months for Participant 1, 7 months for Participant 2, and 3 months for Participant 3, and generalization was maintained in all cases. In Experiment 2, probes continued to occur after subjects reached criterion, for 8 months for Participant 4, 7 months for Participant 5, and 1 month for Participant 6, and the greeting response persisted in all cases. In addition, casual observations indicated that generalizations occurred not only in the four settings where probes took place, but also in all areas of the cottage, to adults other than the probers, and whether the participants were seated, standing, or walking about. It would seem logical to assume that the reason the generalization of the greeting response was maintained over many months of the experiments was because of a combination of the maintenance schedule and the entry of the greeting into natural reinforcement contingencies.

Three of the participants, Donna and Dianne in Experiment 1, and Phyllis in Experiment 2, showed more variability in the T.V. room. This was probably due to the number of distractions in this setting. Large numbers of other residents and staff were always present, various T.V.

programs were usually being watched and many other activities were frequently in progress.

Overall, when generalization occurred to a new prober in any setting, it simultaneously occurred to all probers in all settings. Intuitively, this would seem to deny the conceptualization of "generalization as a passive phenomenon" and support the opinion that it can be considered as "an operant response that can be programmed" like any other operant (Stokes & Baer, 1977).

A recent study by Coleman, Whitman and Johnson (1979), designed to reduce self-stimulatory behavior and increase appropriate play behavior, also tried to produce generalization by training sufficient stimulus exemplars. In that study training was conducted sequentially by 10 teachers in two settings. In spite of the use of many stimulus exemplars, no generalization occurred in the second setting or to the presence of teachers in the first setting who had not yet applied the treatment. The failure of the "aversive-control" treatment package to produce generalized suppression of self-stimulatory behavior is consistent with past research which has examined the effects of punishment and time-out procedures upon self-injurious, self-stimulatory, and other inappropriate behaviors (Fox & Martin, 1975; Lovaas & Simmons, 1969). The failure of Coleman et al. (1979) to obtain generalization of the appropriate play behavior is, however, more difficult to explain in the light of the present and other studies. Coleman et al. suggested changes in the training procedures and the use of a more intermittent schedule, which they feel might have improved the results, but the conditions employed appeared similar to those utilized in other successful studies. It would seem likely that the play behavior

may have acquired some aversive properties from the "aversive control" treatment of the self-stimulation in that the child's play behavior was described by the authors as "primitive" and "highly stereotyped", and the response did not generalize beyond the training situation in which play behavior itself was positively reinforced. In the present study, the participants, three of whom had no record of any previous verbal behavior, appeared to enjoy giving the greeting response, and once the response was emitted it was strongly reinforced by others in the participants' environment.

In summary, this research demonstrated that generalization of a simple greeting response with retarded persons was accomplished with approximately equal facility either by programming the response to two or more trainers in one setting, or to one trainer in two or more settings. The results must be qualified by the small sample size studied. However, assuming that the six clients studied are representative of retarded institutionalized persons as a class, then the findings make it possible for instructors of retarded persons to take advantage of the training of the sufficient-exemplars strategy that is most convenient for them in order to program generalization, at least when teaching behaviors comparable to the simple greeting response examined in this study. A program with a teacher and several helpers might program generalization across persons. Alternatively, a training school which is chronically understaffed could effectively program generalization using one instructor across various settings.

A comparison of the number of stimulus exemplars necessary to program generalization in the current experiment with those in which settings

and trainers were confounded (e.g., Garcia, 1974; Stokes et al., 1974), suggests that a combination of settings and trainers in programming generalization may be no more effective than using just one stimulus-exemplar category. However, further research is needed to confirm this possibility.

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APPENDIX 1

A Technology of Generalization

Stokes and Baer (1977) summarized the major strategies used to program generalization. After reviewing 120 studies they categorized the methods used under nine headings. These headings, as stated by Stokes and Baer, are "loose categorizations" as there is much overlap from one category to another. Many experiments, in an attempt to ensure generalization of a response, have adtoped a "shot-gun" approach to the problem and have used strategies which fall into more than one category. In particular, behavior analysts have often tried to ensure that no matter what other strategy they used, the response would enter "natural maintaining contingencies". The strategies described by Stokes and Baer (1977) and some major studies in each area are summarized below for the convenience of the reader.

1. Train and Hope

Almost half of the applied literature on generalization falls into this category. In these studies, after a behavior change is effected through some manipulation, any existent generalization across responses, settings, experimenters, and time, is concurrently and/or subsequently documented or noted, but not actively pursued.

Examples falling into this category are studies by Azrin, Sneed and Fox (1973), Kifer, Lewis, Green and Phillips (1974), Redd and Birnbrauer (1969). These studies are important for they document the extent and limits of generalization of particular intervention techniques (Stokes & Baer, 1977). However, such studies are frequently characterized by a lack of comprehensiveness and depth of the generalization analysis.

Approximately 90% of the "Train-and-Hope" studies describe successful generalization. The preponderance of positive data, as noted by Stokes and Baer, may simply reflect the tendency of some researchers not to report negative data (i.e., occasions when generalization did not occur). Another reason for the predominance of positive results in this category is that if generalization was not evident than a form of limited programming was frequently instituted. Examples of this strategy then fall into the next category, "Sequential Modification".

2. Sequential Modification

In these studies, after a particular behavior change is effected, generalization is assessed. If generalization is absent or deficient, procedures are initiated to accomplish the "desired changes by systematic, sequential modification in every nongeneralized condition, i.e., across responses, subjects, settings, or experiments" (Stokes & Baer, 1977). Stokes and Baer's definition of generalization was given as follows: "Generalization will be considered to be the occurrence of relevant behavior under different, non-training conditions (i.e., across subjects, settings, people, behaviors, and/or time) without the scheduling of the same events in these conditions as had been scheduled in the training conditions. Thus, generalization may be claimed when no extra training manipulations are needed for extra training changes, or may be claimed when some extra manipulations are necessary but the cost or extent is clearly less than that of direct intervention." Since these studies introduced the original contingency in all settings where generalization did not occur, they do not satisfy the generalization definition. Studies such as those conducted by Meichenbaum, Bower and Ross (1968), and Wahler

(1969), fall into this category.

3. Introduce to Natural Training Contingencies

Overall, behavior analysts tend to select responses that are likely to encounter maintaining reinforcement after training. Hence, the mechanism of "trapping" (Baer & Wolf, 1970) is common to many studies. This is probably one of the most dependable of all generalization programming mechanisms, and is automatically included in many studies. It was specifically commented on in the studies by Baer and Wolf (1970), and Buell, Stoddard, Harris and Baer (1968). A few studies have introduced subjects to "semi-contrived or redesigned natural reinforcement communities" (Stokes & Baer, 1977). Examples are found in the studies by Horner (1971), Seymour and Stokes (1976), and Stolz and Wolf (1969).

4. Train Sufficient Exemplars

This is the "generalization-programming area most prominent and extensive in the present literature" (Stokes & Baer, 1977). It is described as one of the most valuable areas of programming. Studies in this category provide a demonstration of programmed generalization and the measurement of generalized effects beyond intervention conditions. In such studies if the result of teaching one exemplar (either a stimulus or a response) of a generalizable lesson is "merely the mastery of the exemplar taught", with no generalization beyond it, then other exemplars are systematically introduced and taught with concurrent tests for generalization resulting from such teaching, until widespread generalization does occur. Examples of studies using this strategy can be found in Allen (1973), Lowther, Martin and Nicholson (1978), and Stokes, Baer and Jackson (1974).

Most stimulus-exemplar studies have dealt with the introduction of

additional teachers in one or many stimulus situations. Very little research has dealt with "...the analysis of generalization programming by training in a number of settings..." (Stokes & Baer, 1977). The present study was designed to investigate this variable and compare its efficiency to that of using a number of teachers, all operating in one setting, on subsequent generalization.

5. Train Loosely

This category has not been investigated by many behavior analysts. Researchers have normally attempted to maintain thorough control and careful restriction of their teaching procedures. Though it may be that this careful management of techniques to "...a precisely repetitive handful of stimuli or formats" (Stokes & Baer, 1977) may restrict generalization of the lessons learned, any procedure which dilutes the stringency of research and makes results more difficult to assess would have to be introduced with considerable caution. Careful documentation would be required to assess the "generalization characteristics of lessons taught under careful, restricted conditions, relative to similar lessons taught under looser, more variable conditions" (Stokes & Baer, 1977). It would seem to this author that, if the "train loosely" strategy is followed, then simultaneous measures should be taken to assess teaching efficiency, retention, etc., to ensure that other valuable characteristics of behavior modification techniques are not unduly sacrificed to ensure generalization.

6. Use Indiscriminable Contingencies

This category is based on the assumption that if the contingencies of reinforcement or punishment, or the setting events that mark the presence

or absence of those contingencies, are made indiscriminable, then generalization may well occur. In generalization, behavior occurs in settings in which it will not be reinforced, just as it does in settings where it will be reinforced. It could well be that by making the reinforcement contingencies difficult to discern, at least a temporary increase in the response in non-reinforced situations might result. The behavior might then enter "natural contingencies" of reinforcement before it extinguishes. Studies which represent this category are those by Broden, Bruce, Mitchell, Carter and Hall (1970), Pendergrass (1972), and Schwarz and Hawkins (1970).

7. Program Common Stimuli

It is supposed that generalization will occur if there are sufficient stimulus components common to both the training and generalization settings. The literature shows only a few studies which make use of a common stimulus in both training and generalization settings. This is "a technological dimension urgently in need of thorough development" (Stokes & Baer, 1977). The use of peers has proved very practical and successful (Johnston & Johnston, 1972), and that of making the experimental setting more closely resemble the generalization setting has also led to good results (Rincover & Koegel, 1975). The introduction into training settings, of physical stimuli that are frequently prominent or functional in non-training environments should be investigated.

8. Mediate Generalization

In essence, this requires "establishing a response as part of the new learning that is likely to be utilized in other problems as well, and will constitute sufficient commonality between the original learning

and the new problem to result in generalization" (Stokes & Baer, 1977). Most of the studies in this area have been conducted on young children (e.g., Drabman, Spitalnik & O'Leary, 1973; Isreal & O'Leary, 1973; Risley & Hart, 1968) and have shown good generalization to nontraining settings. Language is the most commonly used mediator since it acts as both a stimulus to the speaker as well as the listener. Thus, "it meets the logic of a salient common stimulus to be carried from any training setting to any generalization setting that the child may enter" (Stokes & Baer, 1977).

Self-control and self-management procedures which involve self-recording also function to promote generalization. Such techniques have been employed to promote generalization of behavior change across settings and people (Broden, Hall & Mills, 1971; Glynn, Thomas & Shee, 1973; Herbert & Baer, 1972).

9. Train to Generalize

Generalization itself can be conceptualized as a response and as such can be strengthened by reinforcement. Thus, teachers who encourage a student "to see another example" of something taught and praise the results are programming generalization of a response. However, few studies of this type are found in the literature. There would appear to be a preference of behaviorists to consider generalization as an outcome of behavior change, rather than a behavior in its own right.

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APPENDIX II

Time Frame of Research

As stated in the Discussion section of the thesis the generalization produced in both Experiment 1 and Experiment 2 proved lasting over time. It seemed that the introduction of either dependent variable (the use of additional trainers in one setting, or the use of one trainer in additional settings) produced equally lasting effects on subsequent behavior. Since probes were conducted on all participants in all settings each time one reached the criterion of sufficient training to any teacher, in any setting, this provided not only an ongoing baseline for participants not yet trained, but also an assessment of the continuing generalization of previously trained participants over settings and time.

Experiment 1. This experiment lasted for nine and one-half months. The first participant reached over the 80% generalization criterion at the beginning of July, 1977 and showed slightly increased generalization over the ensuring seven and one-half months involving seven additional probe periods conducted before the termination of the experiment.

Participant 2 reached the 80% generalization criterion in August, 1977 and also showed increased generalization seven months later when the experiment was terminated.

Participant 3 reached the generalization criterion in March 1978 when the experiment was terminated. No further probes were conducted until Experiment 2 commenced in May, 1978, at which point she and the other two participants in Experiment 1 were probed while participants in Experiment 2 had their first baseline probes. She, like the other participants in Experiment 1, showed ongoing generalization.

Experiment 2. This experiment lasted for a period of ten months, from May, 1978 until August, 1979, and the same generalization over time was observed for Participant 4 and Participant 5. A probe conducted by Experimenter 1 at the end of September, 1979 suggested that Participant 6 would also have maintained a similar level of generalization over time had the study continued.