

THE UNIVERSITY OF MANITOBA

DEVELOPING GOOD SITTING POSTURE AND PROGRAMMING
GENERALIZATION OVER DIFFERENT SETTINGS WITH PROFOUNDLY RETARDED
GIRLS.

by

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ABSTRACT

The purpose of the present study was threefold: (1) to determine the efficacy of modelling and reinforcement procedures to teach good sitting posture to the profoundly retarded within a classroom setting; (2) to investigate the generality of the behaviors so taught over settings; and (3) if generalization did not occur spontaneously to determine the minimal intervention necessary in new settings to program such generalization.

The procedures used in the classroom proved highly successful leading to 100% performance on individual trials, and to over 90% generalization between trials in the classroom setting.

Little generalization, however, occurred to the other two settings in which records were kept. When the teacher entered the second setting and modelled the behavior, there was an immediate improvement in sitting posture. No instructions were given, and no contingencies were applied, and the effects of the teacher's presence was transitory in three of the four subjects. There was no effect in the third setting.

In the next phase the teacher gave instructions and intermittent social reinforcement during pre-classroom sessions in the second setting. In addition the girls were given praise and affection, when displaying good posture. This occurred on a randomly chosen VI schedule throughout the rest of the day with the exception of the post-classroom sessions in the same setting. There was a much more marked effect on both pre-tests as well as in the post-tests (in which the teacher still merely modelled the behavior). This effect lasted as long as the recordings were made. In addition there occurred an increase in performance in the third setting at exactly the same point in time though the teacher never appeared in this setting.

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CHAPTER I

INTRODUCTION

A practical problem to behavior modifiers is that individuals emit both adaptive and maladaptive behaviors in many settings and some of these settings may not be accessible to the behavior therapist. While many aspects of a subject's behavior may be modified in one or more settings (e.g. classroom, home or institution) the generalization of these behaviors to other settings may not occur. An important question is: What behaviors in what settings must be modified in order to effect general changes in setting function? i.e. in how many settings must we treat and modify a behavior, before we get widespread generalization?

One of the seven criterion cited for an applied behavioral analysis is that it display some generality: generality over settings, over time and to various related behaviors (Baer, Wolf, and Risley, 1968). As they point out it is unjustified to assume that an application has failed simply because generalization is not widespread. "In general, generalization should be programmed, rather than expected or lamented." The present indications, according to the literature, are that if a procedure is effective in changing behavior in one setting it can easily be repeated in other settings with equal success and moreover it may prove that such a given behavioral change need only be programmed in a few settings to accomplish widespread generalization.

In Manitoba today with the increasing emphasis on community-based mental health programs and with the increased opportunity for the rehabilitation of the mentally retarded from the institutions to community facilities the role of the training school and its staff is changing (Lowther, 1970). It is no longer sufficient to teach behaviors which

occur only within an institutional classroom or cottage. We must now ensure that such learned behavior will generalize to new settings within the community and hence help the retarded gain acceptance and social reinforcement within their new environment. There is little point in congratulating ourselves in emptying our institutions for the retarded if this is tantamount to removing our residents from a setting which, though far from ideal, is "accepting", and in which they find warm peer relationships, into a setting which finds them unacceptable and indeed objectionable and hence gives them little in the way of the normal reinforcers of friendship and company which we all find necessary for successful adjustment.

As stressed by Ferster (1961), in the area of everyday social contacts considerable skill is necessary for producing social reinforcers and the absence of this skill either results in an individual without a social repertoire or one who uses aversive stimulation to gain attention. Under-staffed institutions may be responsible for infrequent and weak reinforcements but in the community the child who has an atypical biological make-up and who indulges in bizarre mannerisms and behaviors does not have adequate opportunities to develop relationships with new reinforcing and discriminative stimuli (Bijou, 1968).

One of the most distinctive and handicapping features of the mental retardation syndrome is the "retarded walk and posture". There are many ways in which this manifests itself but they all draw attention to, and decrease public acceptance of, the retarded individual. It was with this in mind that Lent (1970) included Sitting Posture and Walking Programs in his Five Year Intensive Training Plan for Mentally Retarded Girls. The girls in his training program were, mostly, moderately retarded with

I.Q.'s between 25 and 55. In common with many researchers he found that when the girls were rehabilitated little generalization occurred and they had to be retrained in their new foster homes and work situations. He suggested that in future more attention might be paid to generalization when designing future training programs.

The present study was an attempt to condition the same behaviors in profoundly retarded girls but at the same time to program some setting generality.

This seems extremely important when we consider the position of a child discharged from an institution to a foster home which is geographically remote from the services of a behavior modifier, or where the foster parents may not ask for help but merely return the child as unsuitable. This was amply illustrated in Lent's rehabilitation program. Many children were returned as unacceptable due to the fact that they exhibited head-down behavior and showed avoidance of eye-contact. For some reason, in our society, such behavior, leads to an accusation of shyness or furtiveness. A few remedial sessions led to the subsequent acceptance of the child, when the State School was consulted. This unfortunately did not occur in all cases.

Another major consideration is that of health. Good posture leads to good muscle tone, the correct positioning of body parts and organs and deeper breathing. Many instances of "slobbering" stop when head-up, shoulder-back behavior is maintained.

Last, but by no means least a person with their head up is more aware of what is happening around them, is less withdrawn, and will receive more stimulation from the environment and, with proper environmental programming, will show more tendency towards socialization. Of

course it is up to us to ensure that the environment they observe does indeed provide more interest and stimulation. We must give some consideration to the design of buildings, their decoration and the activities that occur within them.

CHAPTER II

REVIEW OF THE LITERATURE

A. Learning Theory and Generalization

Generalization is a topic of considerable interest to all those involved in child rearing, education, the study of sensory processes, etc. and yet there has been comparatively little active research carried out in the applied field. The animal literature in recent years abounds with varied studies on generalization. The opinions expressed are varied and frequently in opposition to each other. It has been variously called a legitimate behavioral process, an epiphenomenon and an unnecessary extra term in the face of an already verbal descriptor of differentiation (or discrimination). Kluver (1933) stated that the use of the stimulus generalization label, "is at best redundant and at worst confounding". He claimed that every 'generalization' is at the same time a 'differentiation' and vice versa.

The modern concept of stimulus generalization is attributed to Pavlov. He observed that his dogs, when conditioned to salivate to a tone of a certain number of cycles/sec., also salivated to various other tones. "Many other tones acquire similar properties, such properties diminishing proportionally to the intervals of these tones from the original one". He noted that the same thing occurred with the stimulation of other receptor organs. This he called generalization of stimuli (Pavlov, 1927).

In discussing generalization and stimulation he considered that this could present a major problem when a conditioned reflex evoked to one stimulus could also be elicited by other adventitious stimuli, not necessarily very similar to the first, e.g. a response, conditioned to a tactile stimulus might be evoked by a thermal stimulus or a tone. He

felt that if a conditioned reflex was to facilitate adaptation to the environment, the complementary process of differentiation was needed. He showed that the initial generalization could be overcome by the method of contrasts in which one of a pair of stimuli is regularly reinforced and the other not reinforced.

He explained the process of generalization by the underlying neural process of irradiation of excitation in the cortex, and differentiation by the corresponding concentration of excitation. To Pavlov, Transfer of Training is best considered to be the result of generalization (irradiation) whereby one stimulus serves to evoke the conditioned reflex learned to another. Particularly in the language system he felt that words substitute readily one for another and thus permit widespread generalization. Towards the end of his life Pavlov became very interested in the importance of words to man and the role of the second signalling system.

In the Behavior of Organisms (1938) Skinner devoted considerable space to the discussion of Pavlovian Conditioning, especially as regards discrimination and generalization. He agreed with Pavlov on many issues but strongly rejected the idea of using an underlying neural activity as an explanatory theory of behavior. He talked of empirical generalization and regarded it as a behavioral phenomenon and an observable datum. It can be viewed as a dependent variable, or as a set of operations to be used as a testing technique. The data collected by the operant technique have commonly been expressed in the form of response rate as opposed to discrete, single trial responding. Although the use of response rate measures has been severely criticized by Blough and others (e.g. Blough (1965) who states, "A unitary component would have a

much better chance of behaving in a neat, manipulative manner than the conglomerate "rate" commonly used"), Blough still admits that on the empirical level he feels that, "if rate works, use it". Nevertheless he stated that there is a fair amount of data which does not support the use of a rate measure.

On the other hand, Brown (1965) pointed out that the use of a single data point does little to explain the relationship between discrimination and generalization but merely shows them as the reverse side of the same coin. The use of a gradient shows the relationship between the two in a much clearer light. Whether or not this generalization gradient should be expressed in a rate of response measure in extinction, is for many still a doubtful point.

When discussing discrimination training Skinner (1938, pp 227-229) emphasizes that though we may be dealing with one response in the presence of two different stimuli, two operants are involved. These two operants with the same form of response, one in the presence of one stimulus condition and one in the presence of another stimulus condition are selectively reinforced and extinguished. There is an interaction, called induction by Skinner i.e. whatever happens to one operant affects the other to some extent. Selective reinforcement and extinction increase the number of responses available chiefly in the presence of the positive stimulus (response generalization). This is the positive half of the principle of discrimination. On the other hand, response acquired in the presence of the positive stimulus may become less readily available in the presence of negative stimulus. This is the negative half of the principle of discrimination - the breakdown of induction or generalization.

Considering the present study, if we consider the common response is "showing good posture" and the two operants as this behavior occurring in the classroom where it was always consequted by reinforcement, and the same behavior occurring elsewhere in the cottage, where it was usually ignored, it is theoretically reasonable that we would have to program generalization.

Skinner throughout his writings prefers to use the term "induction" for what is commonly called generalization in the literature of conditioning. Such induction is the basis of transfer. The reinforcement of a response increased the probability of all responses containing the same elements. Similarly, the control acquired by a stimulus is shared by other stimuli with common properties. This interpretation of transfer is very similar to the view expressed by Thorndike (1913, pp 23-31) who thought that transfer occurred largely due to assimilation, i.e., transfer depends on the degree of likeness between the new situation and the old.

Hull (1943) made a major departure from the views expressed by Pavlov. He drew upon stimulus generalization while completely rejecting the underlying neurological mechanism proposed by Pavlov. This rejection of irradiation was later accompanied by experimentation using instrumental conditioning as opposed to Pavlov's methods. He incorporated stimulus generalization into his theoretical behavioral system. He and his students were looking for an explanatory device or construct; they required an adequate model to account for many behaviors independent of any specific stimulus or response. Stimulus generalization became a key concept in the analysis of behavioral transfer proposed by both Hull (1943) and Spence (1937). They tried to provide evidence supporting the

existence of a behavioral mechanism of generalization which might account for other observable events such as the summation of habit strengths leading to overt response production. Hull supported the view that there are two aspects of transfer; equivalence of stimuli and equivalence of response. Hull explained the equivalence of stimuli on the basis of generalization or via intermediate responses. Equivalence of responses he felt depended in part on response oscillation and on the organization of responses into hierarchies by way of the habit-family hierarchy. All responses in the hierarchy had in the past led to the same goal, so that they were in that respect equivalent.

Guthrie (1959) because of his contiguity theory differs from most of the other learning theorists. He expected little transfer of training. According to his reasoning the only way to get desired behavior in a new situation is to practice in that new situation as well. To be able to perform in a variety of situations, you must practice in a variety of situations.

To many of us who have struggled to achieve generalization his views seem, superficially at least imminently sensible. This problem does not only occur when training the profoundly retarded but our high school teachers complain bitterly that the literary skills taught during "English" do not transfer to work in social studies or history. However if we take his suggestions too seriously we might well be dismayed as the amount of practice in various situations which would be necessary for adequate daily performance, unless we programmed some conceptual generalization in all our programs.

Fortunately in common with most learning theorists, no matter how they express the thought, Guthrie accepted the fact that learning transfers to new situations because of common elements within the old and

the new. In this his position is like that of Thorndike. Stress is laid, however, on the identity being carried by way of common responses evoked, the proprioceptive stimuli being sufficiently similar from responses to a variety of stimuli to evoke common conditioned responses. This emphasis on movement-produced stimuli is typical of all of Guthrie's work.

Very different from Guthrie are Tolman (1954) and the Cognitive Psychologists. All cognitive theorists expect a large measure of transfer, provided the essential relationships of the situation are open to the observation of the learner.

All the experiments on change of reward, change of drive, place learning, and latent learning are experiments on problems related to transfer, that is, the ability to use something learned in one situation in another.

Overall, though there is considerable controversy as regards the mechanism and control of generalization in various learning theories, a common thread can be seen in all accounts of this behavioral phenomenon. This thread consists of the acceptance by all theoretical schools of the role of similarity in stimuli and responses in the production of stimulus generalization and response generalization respectively.

The general view of stimulus generalization equates it with transfer of training and attributes such transfer to the presence of stimulus components or dimensions common to both conditioned and test stimuli. It is also largely assumed that the degree of transfer will increase directly with the number of shared components.

B. The Relationship between Generalization and Discrimination

Many of the conflicting reports which arise from those involved in the study of discrimination and/or generalization seem to be largely the result of semantic confusion and poorly defined terms. Many well designed and carefully controlled experiments still seem to lead to conflicting results and erroneous conclusions as to the relationship between generalization and discrimination. A careful reappraisal of such terminological matters could resolve many contradictory findings and help us establish the role of both processes in individual experiments and their conceptual relationship.

Stimulus Generalization. In general those who use this term seem to mean by it one of two things (1) a simple, concrete empirical phenomenon, or (2) an abstract process that underlies, mediates and allegedly explains the empirical phenomenon. We will consider these in turn.

Those who view stimulus generalization as an empirical phenomenon assert, by definition, that a subject displays generalization if, after he has learned to respond to a conditioned stimulus, he reacts in an identical or similar way to a non-conditioned or generalized stimulus even in absence of specific training to the generalized stimulus. Or to express this in terms of the operant paradigm, a subject shows generalization if after he has learned to perform in the presence of one stimulus condition, he reacts in a similar way in the presence of a new or slightly different stimulus condition in whose presence he has received no training. Defined in either of these manners, the concept of stimulus generalization means simply that transfer of training has occurred and nothing more. Here generalization is defined in terms of the empirical findings that, following reinforced trials in the presence of one stimulus, response strength in the presence of a new stimulus is

greater than 0% even though no reinforced trials have been conducted in the presence of the second stimulus. This is essentially a "definition in use" since it indicates generally the conditions which must be fulfilled for the intended meaning to be conveyed to the listener.

The second major way in which stimulus generalization has been used is as a name for some kind of covert process or mechanism conceived to underlie or determine overt transfer: e.g., a spread of habit strength, cortical excitation or the excitation of common sets of neural elements, etc.

As components of a behavioral system, generalization as an empirical phenomenon occupies the position of a dependent variable, whereas the second conception fulfills the function of an intermediary construct.

These two meanings are often confounded. For example in a recent summary of the generalization literature (Mednick and Freedman, 1960), the opening sentence reads: "Stimulus generalization is an empirical phenomenon which has, of late, been seeing heavy duty as an explanatory construct in many disparate situations".

Stimulus Discrimination. Similarly there are two different concepts of discrimination in common use. As with generalization, discrimination may be taken to mean nothing more than the empirically established facts. By this definition a subject is discriminating if, after training in which responding in the presence of one stimulus has been repeatedly reinforced, he does not react with comparable vigor to a new stimulus even though no non-reinforced trials in the presence of that stimulus have occurred. Used thusly discrimination is simply a failure (complete or partial) of training to transfer from one stimulus to another.

The second meaning of discrimination used is very vaguely defined. Those who use it do not seem to find formal definitions acceptable or adequate. It is variously defined as a conscious awareness of differences, perception of similarities, a process preventing empirical generalization, etc. Brown (1965). It is not a useful concept as almost inevitably discrimination in this sense is advanced as an explanation of discrimination in the empirical sense and contributes nothing to our knowledge.

If we work consistently with the empirical definitions of the two terms it is easier to investigate the possible relationship between them. The answer to a large extent depends on whether we are concerned with a single data point or with a gradient and on the kind of variables we wish to manipulate and evaluate.

Suppose we are concerned with response strength as measured in the presence of two different stimulus conditions, S_1 , where the response has been previously reinforced, and S_2 , which is a new stimulus condition. If the response strength at S_2 is only one third of that recorded in the presence of S_1 we would argue as follows. Since the response at S_2 is significantly greater than zero this signifies that transfer of training from S_1 to S_2 did take place or that generalization did occur. On the other hand the response strength at S_2 is appreciably below that at S_1 and this means that the subject was reacting differentially to S_2 as compared with S_1 and this in our empirical definition defines discrimination. Evidentially when we deal with only a single data point from a single experiment, generalization and discrimination are nothing more than two different ways of defining the same experimental result. Kluver (1933) no doubt was thinking along these lines when he accused Pavlov of merely confusing the issue when he first introduced the term stimulus generalization.

If we now manipulate some variable which elevates the response strength at S_2 , such an outcome would mean that generalization had increased while discrimination had decreased. Conversely, if a change in some variable lowers the response strength at S_2 , we could say that discrimination had increased and generalization had decreased. This is one perfectly clear sense in which generalization, and discrimination can be said to be inversely related. Hence when we only consider a single data point discrimination and generalization are compliments of each other and equally valid ways of reporting the same datum.

But now, let us assume that we manipulate a different variable, the number of training trials given to the subject. This might well elevate and steepen the gradient. As the gradient becomes higher and steeper, generalization and discrimination both increase. In this case then generalization and discrimination are seen to be directly related, rather than inversely related.

If a manipulated variable raises (or lowers) the gradient without altering its slope, generalization may increase (or decrease) without affecting discrimination. This is only true if one uses the absolute difference for one of the variables. If a relative index is used for both, one can not vary without the other. ie Discrimination and Generalization must then vary conjointly.

Hence we may assume that the relationship between discrimination and generalization depends on the kinds of variables and measures which we have chosen. They may be inversely related, directly related or quite unrelated.

The foregoing argument permits us to dismiss, as without uniform meaning, the assertion made by so many psychologists that generalization merely stems from a failure in discrimination. This conclusion is restricted

to the consideration of single data points from single experiments.

Many of these psychologists have used the second form of defining their terms, especially as regards discrimination. As stated earlier when discrimination is stated in perceptual-cognitive language though a formal definition is possible, this is seldom done and hence a great deal of confusion results.

This has led such respected figures as Kimble (1961, p. 361) to state, "There must be an influence which restricts the range of generalization and restrains the organism from making the same response to all physically similar stimuli. This influence is called discrimination." In many ways one must agree with him as complete generalization, without discrimination, could only lead to chaos. However, this is no reason to consider generalization as merely a failure to discriminate. Generalization deserves investigation in its own right and an empirical approach will help determine the variables which control it in a lawful manner.

When Kalish (1958) stated that "the generalization function is the result of a failure to discriminate" this seemed like a very negative approach. This was also essentially the view held by Lashley and Wade (1946), Schlosberg and Solomon (1943), Philips (1947) and to some extent by Mednic, and Freedman (1960).

An experiment conducted by Brown, Bilodeau, and Baron (1951) gives an excellent example of generalization which occurred under seemingly clear-cut conditions to minimize generalization. The subjects were presented with seven small lamp bulbs arranged in a horizontal row at about eye level in a dimly illuminated room. Since the bulbs were white against a black background and were separated by an inter-lamp

distance of about eight inches, they could be clearly seen even when unlighted. Moreover, the central light was marked off by a nearby green fixation lamp. The subjects were instructed to react with a manual response as quickly as possible to the lighting of the middle lamp, but to refrain from reacting to other lamps.

In spite of these instructions, they showed clear-cut tendencies to make "generalized" reactions to the peripheral lamps. Had the subjects been asked prior to the experiment they would not have hesitated to say that they could "tell the difference" between the central and adjacent lamps. It would therefore make no sense to say that their generalized responses were due to a failure to discriminate.

Similarly the results of experiments by Guttman and Kalish (1956) and Kalish (1958) dealt with slopes of gradients rather than the amount of generalization per se and these did not indicate any sort of inverse relationship between generalization and discrimination.

As summed up by Mostofsky (1965), in spite of the conflicting views expressed, and the difficulties involved in agreeing on any one definition, the volume of research on stimulus generalization is steadily increasing. Many mistakes are still being made and the terminology used still leaves much to be desired but however defined, stimulus generalization is accepted by contemporary writers as an undeniable characteristic of behavior. "The fact is now so well established in both respondent and operant behavior that we may state it as a principle" (Keller and Schoenfeld, 1950). As a result there is hardly any serious exposition of behavior that does not try to account for the phenomenon.

C. The Role of Stimulus Control in Generalization and Discrimination

When a stimulus through operant conditioning has come to set the occasion for a response, this same response will occur in the presence of other stimuli to the degree to which they are similar to the original stimulus. This is the principle of stimulus generalization. If the original stimulus has complex stimulus dimensions, generalization may take place along each of these dimensions. Because of generalization, organisms do not have to relearn appropriate responses in every situation. If a new situation is similar to those that have occurred in the past, then behavior that has been reinforced in the previous situations will tend to occur in the new situation.

Although this principle of behavior enables adjustive behavior to generalize to new situations, it can result in maladaptive behavior in these new situations, that is, it may lead to behavior that is not followed by positive reinforcement in the presence of these new stimuli. When this occurs the organism adjusts to the new reinforcement contingencies, i.e., it discriminates. That is, if behavior is reinforced in the presence of one stimulus situation but not in a similar stimulus situation, the behavior will come to occur only in the presence of the former stimulus condition. The stimulus situation in whose presence the behavior is reinforced is called a discriminative stimuli. Discriminative stimuli come to control the behavior, since a given response occurs in its presence but not in its absence. It is in this way that various aspects of the environment, including social aspects, come to control people's behavior. Individuals as stimulus objects also gain control over our behavior, in other words become discriminative stimuli.

If an instrumental or operant response is to be brought under stimulus control, then reinforcement must be provided for responses occurring to that stimulus but not for responses appearing in its absence. When a differential reinforcement program of this sort is followed, response strength to the controlling stimulus is generally high and sharply sloping gradients may be found along dimensions orthogonal to that formed by the stimulus-non-stimulus axis. (Mostofsky, 1965, p. 20)

When, however, we want to utilize the effects of adaptive behavior trained in this way in one setting and have it transfer to other settings we must remember that the same processes will be operative. If the subjects are trained to perform certain desirable behaviors well, say, in a classroom where strict stimulus control and discrimination training are used and we want to ensure that generalization will occur to other settings there should be some reinforcement for the behavior in these new settings. Hopefully some natural reinforcers or contingencies may take over but failing this we are unlikely to get any widespread generalization unless we program such generalization at least to a minimal extent.

D. Some Implications of Generalization

Though it is easy to think of many examples where generalization appears to hinder the adaptation of an organism to its world (eg. the case where a young child first says da-da in the presence of his father and is warmly reinforced for this response and subsequently generalizes to all male subjects with a similar vocalization or when he calls all furry animals "cats", till this is corrected), on the whole generalization is a very useful property of behavior. For instance skills learned in one environmental situation can be used in new environmental situations.

Parents who teach their children to say "thank you" at home are implicitly relying on generalization to ensure that the "thank you" will occur outside the home. Our educational system proceeds on the assumption that the skills acquired in school will be spread to environments outside the school. Nevertheless, the generalization gradient is there to remind and caution educators that the more closely a training situation resembles the situation in which the behavior will later be needed, the more effective will be the training. Schools and other agencies use this principle when they make the teaching situation as near to "real life" as possible.

After a response has been strengthened in the presence of a particular environmental configuration, it will also occur, but to a lesser extent when the environment is changed slightly in some way. The response may cease to occur altogether when the change in the environment is very large. In generalization gradients, the difference between training and test stimuli is the independent variable. When working in the applied field we might do well to keep this factor more constantly in mind. Perhaps it would be better to condition each behavior in the situation in which it applies rather than in classroom or individual session rooms. In the present study it was necessary to investigate whether generalization would occur from one setting to another but when we consider any further use of the procedures to develop good sitting posture it might be simpler and more effective to bypass the generalization problem by conducting the training sessions in, for instance the dayhall and dining room. It would of course be necessary to access

the relative effects of the strong stimulus control, and control of all extraneous variables possible in the classroom setting, and the large change in environmental stimuli from a quiet and orderly classroom to a busy, overcrowded and bustling dayhall which might prevent any generalization occurring. Perhaps, best of all, we should conduct training sessions in both locations. One experiment by Kalish and Guttman (1957) would lend support to the latter suggestion. In this experiment they alternated light of 530 mu and 560 mu during initial strengthening and subsequent VI stabilization. Testing for generalization was accomplished in the usual way. It appears that the gradient they obtained was a composite of the individual gradients. Later work, Kalish and Guttman (1959) in which they used three training stimuli seemed to confirm their summation hypothesis. The important feature of this procedure of training at more than one stimulus value is its ability to widen the generalization gradient.

E. Generalization in the Applied Field

Studies on stimulus generalization in the applied field are all too uncommon. Now that it is so generally accepted that human behavior can be successfully modified by the correct application of operant principles, the time is surely ripe for follow-up studies which include some measure of the generalization of the behaviors so taught.

Lent (1970) in his five year intensive training plan to prepare retarded girls for their return to community settings became more and more aware of the importance of this factor. Eventually in each of his many individual training programs, which ranged from the teaching of simply academic skills such as the use of the Rainier Reading program to

the simplest of self-care skills, he tried to program generalization. He tested not only the present degree of performance but the amount of generalization developed on each training task.

A study which relates to the present one is Wahler's (1969). He was concerned with the specificity of child behavior. He argued that if a child's behavior is a principal function of short-term environmental consequences and antecedents, then the behavior might well be situation specific. That is, the child's behavior in various settings should conform to the contingencies present, regardless of between setting contingency differences.

This argument he felt was important to child behavior modifiers since a child showing behavior problems in one setting usually also showed such problem behavior in other settings. One common example is the child who behaves poorly at home and who is also recognized as a "problem" at school.

Wahler was concerned that no assessment had ever been made of setting generality: the influence of operations performed in one setting on the child's behavior in other settings. His study was a limited attempt to evaluate the setting generality of commonly used behavior modification techniques. More specifically, deviant child behavior in school settings was evaluated as a function of contingency changes in the children's home settings.

He used two boys, aged 5 and 8 years, who had been referred to an outpatient clinic for psychological problems, as his subjects. Both showed severe behavior problems at school and their parents readily agreed that this behavior occurred both at home and in other settings.

Two observers recorded the occurrence of poor behaviors in the school setting and two recorded the same responses in the children's homes. For one child the response class was oppositional behavior. When a request or command was presented to him, observers scored his behavior as either oppositional or cooperative. The second child showed disruptive behavior as opposed to good study behavior. The observer's similarly recorded these behaviors in both settings.

"Teacher attention" and "parent attention" were also recorded as were "instruction" (asking questions or giving commands) in the case of the second subject.

Following a baseline of the current behavior, parental training was carried out until the parents were correctly applying the contingencies. The first treatment phase was then introduced, followed by a return to baseline and then a second treatment phase.

After the second manipulation of parent-child contingencies it became evident that the home and school settings were functionally independent. The children's behavior improved vastly at home but remained unchanged in the school setting.

The teachers received training similar to that of the parents. To provide more conclusive evidence of functional independence, it would have been desirable at this point to perform contingency operations in the school while holding the home contingencies constant. However because of parental concern over the prospect of continuing baseline conditions at home for additional weeks this step was not taken. Instead the teachers were instructed to apply the contingencies at school and the parents resumed their use of the procedures at home.

Little change in the school behavior occurred at first. This was due to lack of teacher attention to desirable behavior. When this was corrected the behavior of both boys at school showed considerable improvement.

As was expected the data showed no sign of setting generality. Instead each child responded to the contingencies operating in each environment. We are left with the question: what behaviors in what settings must be modified in order to effect general changes in setting function?

Few attempts have been made to train retarded individuals to make more abstract vocabulary responses, or to determine their ability to generalize acquired responses of this type to other similar stimuli. However, one recent study (Haugen and McManis, 1972) did attempt to train educable mentally retarded children to make more abstract responses (naming, formal description, and functional description) to vocabulary items. This study also examined the ability of the subjects to generalize such responses to similar items on which they had received no training. The most pronounced effect of the 14 day training program was a significantly greater reduction of unacceptable responses by experimental subjects than by controls to both training and transfer items. While the training program in the study did involve presentation of vocabulary items in groups of three which constituted distinct categories, and the descriptive accounts provided for the items included both category names and category functions, no attempt was made explicitly to elicit this information from the subjects in their vocabulary responses. Also, this training program did not involve presentation of other items, with each set of three, which were not included in the category exemplified by the set. Thus the subjects were not required to make discriminations

between the items of a set and unrelated items on the basis of either the category name or function.

A study by Nye, McManis and Haugen (1972) was designed to study the effectiveness of a training program for teaching trainable adolescents and retarded adults categorization skills. The training procedure in this study utilized pictured noun objects for stimuli. However, in this study the subject was presented not only with three items which exemplified a category, but also with four unrelated cards from which it was necessary to discriminate the category cards. In this study the training program directed the subject's attention specifically to the names and functions of both the categories and the individual items composing them through explicit questioning which required the subjects to make active responses. The finding in this study indicated that the overall effects of the training procedures were pronounced. When the direct training and transfer effects are considered separately, the results show that the training procedure was effective both in improving performance on the items involved in the training itself, and for items on which no training was provided.

A study by Rimland (1964) used children with behavior disorders as subjects. These children typically show pro-nominal reversal, perseveration and mixed up words and meanings. Rimland (1964) attributed the speech disorders of these children to an inability to generalize.

In another study using an 11 year old brain damaged boy as subject, Barton (1970) also dealt with the same problems of perseveration and inappropriate speech. The boy's response to magazine pictures was selected as a useful target behavior for modification by reinforcement and time out procedures. The magazines, opened at suitable pictures, were placed one at a time before the boy. The experimenter

then asked a simple question relevant to the picture. If the child made an appropriate response to the picture he was reinforced with candy and praise; if he made an inappropriate response the magazine was closed and he was given a brief time out of ten seconds. If a negative response ("No!", or "I don't know", or silence) occurred these were ignored and the experimenter simply turned the page to the next picture.

A baseline was taken, then these contingencies were put in operation for 10 sessions. A probe (no-contingency) session was carried out (one session). The contingencies were then reversed for 10 sessions and another probe was introduced. The original contingencies were then reinstated and, after another ten sessions, another probe was used.

The experimenter felt that the importance of generalization could not be overemphasized. "However effective a procedure may prove in the laboratory if its effects do not generalize to home, classroom or hospital ward, the practical implications are minimal." It was therefore decided that it would be most useful initially to investigate a situation where generalization would be most likely to occur to see what effect just a slight difference in the generalization situation from the experimental situation would produce. Therefore, a test similar to the task in the reinforcement sessions was devised and was administered by the same experimenter, in the same situation, except that no reinforcement was given. It contained 99 items and was composed of two subtests; one of magazine pictures with 33 questions, and one of 66 general conversation questions. No reinforcement was given for response to either of these tests. The tests were repeated without change during the study at times when the current level of generalization

would be of interest. Specifically the tests were given three times before the first baseline session, once immediately after the first 10 sessions of reinforcement of appropriate responses and before the no-contingency probe which also followed these sessions, and once again at the end of the second 10 sessions of reinforcement of appropriate responding (but this time after the no-contingency probe to control for any sequence effects).

Though there was a little increase in generalization throughout the study the author found the results disappointing. The ordinary probe studies which also produced no reinforcement produced much better results. She suggested various hypotheses to explain this failure including brain damage, insensitive measures of generalization, and the possibility that generalization may not occur naturally, a conclusion reached by many others.

The results reviewed indicate that we are still far from a complete understanding and any satisfactory control of stimulus generalization.

CHAPTER III

STATEMENT OF THE PROBLEM

The purpose of Phase I of the study was to evaluate the effectiveness of modelling correct posture and reinforcement to develop an imitative repertoire.

The purpose of Phase II of the study was to determine if the continuation of the classroom sessions carried out in Phase I, but now accompanied by the intermittent reinforcement of the defined correct postural behavior in subjects not actually receiving a trial, would show an increase in generalization within the classroom setting. Records were also kept in the other two settings, dayhall and dining room, to determine if any setting generality would occur.

In Phase III of the study the teacher entered the second setting, the dayhall, and modelled the behavior during both the pre-tests and post-tests carried out before and after each classroom session. No instructions were given and no reinforcement for good posture or disapproval for poor posture were given. Observations were taken as before in all three settings. The object of this phase was to determine if the stimulus control of the teacher's presence and the presence of a model would be sufficient to increase setting generality. An additional concern was whether any immediate improvement shown would be lasting in the absence of any contingencies.

In Phase IV, classroom training was again continued as before. The teacher was present in setting two during both the pre and post-tests. During the pre-tests she gave some instructions as used in the classroom and verbal reinforcement for good sitting posture. During the

post-tests she was again merely present and seemingly unaware of the subjects behavior. The teacher also entered the dayhall on a VI schedule throughout the day and intermittently reinforced good posture with praise and attention. The purpose of this phase was to determine if the introduction of a contingency for good posture during the pre-tests, and intermittently throughout the day, would lead to a different record during pre and post-tests. Of further interest was the effect on the third setting where no manipulations were introduced.

The purpose of Phase V was to assess what would constitute a reasonable level of "good posture" to use as the criterion for the experimental subjects in a "real life" situation. Although it was necessary during training to set a very high and tightly defined criterion for good posture, it was unreasonable to expect the subjects to conform to all five of the behavioral definitions used at all times in all settings. Since the aim of the training was to increase the subjects' acceptability in normal society and increase sociability, the scoring criteria had to be geared to a real life situation. To this end frequent video tapes were taken in the dayhall during post-tests. These showed the posture of the four subjects, the posture of other residents, students and staff who happened to be present. Data was also taken of other people in normal situations. By means of these additional observations a more realistic gauge of acceptable sitting posture was developed.

The purpose of Phase VI of the study was to devise some means of ensuring that the improved postural behavior developed would persist in the experimenter's absence. To this end the help of the cottage staff was requested. They were asked to assume the task of intermittently reinforcing good postural behavior with some praise and attention. Hope-

fully reinforcement on a more and more intermittent schedule will maintain the behaviors taught in the classroom.

CHAPTER IV

METHOD

A. Subjects

Four profoundly retarded females (I.Q. < 20) participated in this study. Table I presents a summary of the institutional records of the respective residents. The subjects had all had some previous training in posture and gait throughout the previous eight months in a project designed to introduce undergraduate students to the application of operant principles to the teaching of the severely and profoundly retarded. Some initial progress had been made but the classroom performance at the beginning of this study still left room for considerable improvement.

The subjects were all residents of Cedar Cottage at the Manitoba School. This cottage is part of the Research Unit at the Manitoba School. Here programs using operant Conditioning Techniques are designed and have gained increasing prominence in the treatment of all levels of mental retardation. These procedures have proven especially successful in the management of profound and severe mental retardation, and numerous institutions in North America have adopted this approach. In addition many undergraduate and graduate students in psychology have received practical training in this setting. The subjects had therefore been previously involved in other operant programs such as grooming and dressing programs, bedmaking, etc.

B. Apparatus and General Classroom Procedures

All training sessions were conducted in a classroom approximately ten feet by 20 feet. It contained the four chairs for the residents, each chair with a pegboard attached to one side and an or-

Table 1

A Summary of the Institutional History of the Retarded Girls Participating in the Study
 Vineland Social (Stan-
 Maturity Scale Ford-Binet)

Subject	Years in Institution	Diagnosis	I.Q.	Complicating Med. Factors	Complicating Soc. Factors	Chron. Age	Social Age	Social Quot.	Mental Age
Subject 1	16	Idiopathic Men. Retard.		Possible Birth injury Head & shoulder Tilted on one Side Since Infancy	Little verbal behavior Hallucinates Abusive when Unoccupied	22	5.6 yr.	.29	2 yr.
Subject 2	18	Prematurity (2 months)	--	Epilepsy Perseveration	Antisocial Withdrawn No Verbal Behavior	27	4.2 yr.	.19	2 yr. 3 mo.
Subject 3	16	PKU	--	Not Diagnosed Until Age 16 Epilepsy Eczema	Aggressive No Verbal Beh. Short Attention Span	27	3.7 yr.	.15	2 yr. 5 mo.
Subject 4	16	Genetic Defect Idiopathic		Epilepsy Defective Gait	Extreme Early Deprivation	25	3.5 yr.	.17	--

dinary straight chair from which the teacher modelled the desired behavior. The classroom was connected to an observation room by one-way glass. Here two observers kept records of the between-trial behavior of the subjects using a five second observe-record tape and Data Sheet 1, shown in Table 2.

Both the classroom observers and those who conducted similar observations in the dayhall and dining room were given considerable practice both in correctly interpreting the behavioral definitions and recording on the data form while listening to the tape during the preliminary sessions. If any disagreements arose or if any of the original definitions seemed ambiguous each observer, the two members of the Behavior Modification Staff who carried out the reliability checks and the teacher, all wrote out what seemed to them to be the clearest possible definition of the behavior concerned. These were then compared and discussed until agreement was reached.

In the classroom the view obtained of the subjects' posture from the observation room was so good that the lowest interobserver reliability index ever obtained was .92. Daily reliability checks were carried out in this setting for one week. By this time the reliability indexes were consistently over .97. From then on twice weekly checks were carried out.

The reliability indexes were calculated by dividing the number of agreements by the number of agreements plus disagreements.

The subjects were peg-trained just prior to the study. They originally worked on a ratio of five pegs to one back-up reinforcer but this was gradually increased to a ratio of fifteen pegs to one back-up reinforcer by the time the subjects were ready for Phase II. Candy,

cookies and coke were used as the back-up reinforcers and all tangible reinforcement, both pegs and edibles, was accompanied by warm praise and attention. They were told how good their behavior was, how nice they looked when sitting up so well, talked to, patted on the back, etc. while cashing in their pegs. They were also encouraged to show each other how well they could manage their posture.

Two classroom sessions were conducted each week day, one in the morning and one in the afternoon. Each session lasted for thirty minutes.

During trials, the teacher modelled the correct behavior and gave the appropriate verbal command. A red stimulus light was switched on as soon as the subject showed the correct behavior and remained on till the required time duration was reached and the resident reinforced. An uncompleted trial led to light-off and a sharp "No!"

C. Dayhall and Dining Room Observations

Observations were carried out before and after each classroom session in the dayhall, and in the dining room just following the noon-day meal when the subjects had finished eating and were waiting to return to the dayhall. These observers also used Data Sheet 1. and a five second observe-record tape. In these settings the observers used ear-plugs to ensure that the subjects would not find the tape recording an S^D for good sitting posture. Again frequently reliability checks were carried out. In these settings it was much harder to get an unobscured view of the subjects' posture always from the same distance and angle. The observers were instructed to always observe the subjects from the front since even the slightest slouch or sprawl seems greater when viewed from the side position and this could occasion variations in recording. Here

daily reliability checks were carried out for three weeks and thereafter three times per week to ensure that the Reliability indexes remained high. After two weeks the reliability indexes remained consistently at .95 or higher.

D. Behavioral Definitions

The subjects had to conform to the five behavioral components prespecified to obtain a perfect record.

The observers were instructed to observe each resident for a five second interval and record the occurrence of all poor posture which occurred in the next five second period. If they completed recording before the five second interval was up they were to keep their head lowered till the next five second observe period, then raise it and observe the second resident. This was to ensure that they did not inadvertently record behaviors which occurred outside the specified observation time.

It was felt that it would be easier for them to observe instances of poor posture, than to record expected normal behavior which we all tend to take for granted (desirable behavior all too often goes unnoticed; undesirable behavior is seldom missed). Also since it was easier to record, say, the code "s1" for slouch, rather than "no s1", they were instructed to record all instances of poor posture observed which was described, by the Behavioral Definitions.

1. Head Down

- (a) Head drooped towards chest sufficiently to prevent maintaining easy eye contact without Subject peering up from under brows. The front part of the tope of the head will be visible.

Brief responses occasioned by normal S^D's for this behavior e.g.

something falling on the floor, looking at something in the hands, at another resident sitting on the floor, etc. should not be scored wrong unless the duration of the response exceeds three seconds.

- (b) Head drooped towards one shoulder sufficiently to stretch neck muscles on opposite side, i.e. the head must be tilted sufficiently to look twisted or bizarre. Do not record the slight tilt often observed when one is engaged in normal conversation. Be careful not to record normal head to the side behavior as an Subject glances around a room. If Subject glances downwards and sideways to see something below eye level which is occurring at her side, do not mark this incorrect unless the duration of the response exceeds three seconds. Brief episodes when the head leaves the correct position and quickly returns to it should never be recorded.

2. Slouch

- (a) When viewed from the front, a marked rounding of the shoulders (so that the chest is caved in) should be seen.
- (b) Body bent forward from the waist so that the back does not, or could not, maintain contact with the back of a chair (be careful not to automatically record this slouch and head down together. There are occasions when a slouch occurs without head down).

Again remember that brief episodes of the behavior made in response to normal Stimuli, e.g. picking up something, looking at something on the floor in front of the feet, etc. should not be recorded unless the duration exceeds three seconds.

- (c) One shoulder drooped lower than the other, with the body tilted in the direction of the lowered shoulder.

3. Sprawl

- (a) Lower part of back does not touch the chair back, the legs are stretched far out in front or to the side.

Where the lower back does not quite touch the back of a chair because it is too deep or too high for the subject's feet to reach the floor otherwise, this should not be recorded.

- (b) Body stretched out over the side of the chair.

4. Deviant Hand/Arm

The hands should be placed neatly in the lap with one hand touching the other. One hand may be enclosed within the other, or the fingers may be intertwined. Fingers of one hand should not extend beyond the wrist of the other hand. Hands grasping the wrist, forearm, etc. are scored wrong. Similarly arms resting on legs are scored wrong.

Minor transient movements such as brushing hair from face, scratching, etc. should not be scored wrong unless their duration exceeds three seconds.

5. Deviant Foot/Leg

Feet should be placed together on the floor, or within four inches of each other, with the knees no more than 3" apart, crossed neatly at the ankle, or crossed at the knee, with the crossed leg and foot hanging neatly down, not resting on the other knee. Feet placed one on top of the other should always be scored wrong.

General Comments

Brief movements from one correct position to another, or from one correct position back to the same correct position should never be scored wrong. Stereotyped, rhythmic movements such as rocking, or repetitive movements (tics) are not included in this program, and are not recorded.

All subjects should be viewed from the front.

E. Specific Procedures and Results

Phase I

This phase involved the evaluation of the procedures used to develop good posture in the profoundly retarded in a classroom setting. Initially the target behaviors were not in the subjects' repertoires.

When the subjects entered the room, they were told to sit down in their chairs. When they had complied with this command and sat quietly the session began. If there was any noise the additional command, "Be quiet, please" was given, and as soon as silence prevailed, the teacher sat in her chair and the first trial began. Each subject was given eight trials in each session (this was found to be the maximum number always completed in the available time at the beginning of training). At first each subject was taken in turn, working from one side of the room to the other; later the girls began to anticipate a trial and adjust their posture just before their turn, so thereafter trials were randomized in order, to help ensure that appropriate posture would be maintained at all times in the classroom. Similarly, later in training, if at any point a subject showed particularly poor posture, a trial was postponed and the subject ignored till this was at least partially corrected. Later when the number of prompts decreased and physical guidance was eliminated the eight trials were frequently completed before the session was over.

Additional time was then used in giving group trials to a single command; e.g. "Girls, Sit up straight". At first few of the subjects received reinforcement in the group situation, but later they all responded as quickly as possible and seemed to enjoy their ability to compete with each other, and work as a group.

The correct postural behavior was modelled and accompanied by the appropriate verbal command. An imitative repertoire was developed which initiated an approximation to the final desired behaviors. Subsequently by the use of fading, shaping and positive reinforcement the topography of these behaviors was refined and their duration lengthened.

Initially each behavioral component was conditioned separately. For instance to the command, "Hold your head up, X", the subject made the desired response and this response was immediately reinforced by a peg and liberal praise and attention.

Finally, to reach the criterion of a successful trial the subjects had to respond correctly to the command, "Sit up straight", within two seconds after the command, without physical guidance and with a maximum of two verbal prompts per trial. Their posture had to conform to the five defined behavioral components which constituted "good sitting posture". A red light was switched on as soon as the correct posture was presented and the subjects had to maintain their position without further movement till the required time had elapsed.

If the correct behavior was not maintained for the trial duration the light was switched off. This was accompanied by a sharp, "No!", the withdrawal of all attention from the subject and no peg reinforcement.

The duration of the trials was gradually lengthened from two seconds to twenty seconds. Each time a subject correctly fulfilled the

trial criterion for all eight trials for three consecutive sessions the trial duration was increased by two seconds. If the subjects failed to meet the new trial duration over three consecutive sessions the trial duration was conversely reduced by two seconds.

The duration of the trials was held constant at twenty seconds so as not to confound the effects of any other phases and experimental manipulations introduced later in the study.

These classroom sessions, thirty minutes in the morning and thirty minutes in the afternoon were continued throughout the entire study.

Results

The subjects all reached 100% trial performance at a twenty second duration over the last six sessions before Phase II was started. The topography of the behaviors emitted by one subject, Subject two, however, though they fulfilled the requirements of the behavioral definitions, was not as satisfactory as that of the other three. She also showed greater lack of attention between trials. The other three subjects were already beginning to show considerable generalization between trials.

Phase II

The object of this phase was to develop a high degree of generalization within the classroom setting. Classroom trials continued as before. In addition subjects were intermittently reinforced for displaying good posture between trials. Any restlessness or poor posture between trials rapidly led to a lack of this intermittent reinforcement and a brief time out from the teacher in which no trials were given.

Two observers, using a five second observe-record tape, recorded all instances of poor posture according to all five behavioral components, in all subjects between trials. All intervals in which trials, reinforcement or instructions of any sort were given to the subjects were excluded from the generalization data. The recorders were behind the one-way glass so that the subjects were unaware of being observed. Data Sheet 1, shown in Table 2, was used by the observers.

During this phase and throughout the remainder of the study, fifteen minute observation periods were conducted in the dayhall before and after each classroom session. Similar observations took place in the dining room after the subjects had finished their noon meal and were sitting waiting to return to the dayhall. The same observe-record tape and data sheet were used.

Since it was considered essential to obtain a high degree of generalization within the classroom setting before proceeding further, classroom training was to continue and Phase III was not to be introduced until the generalization in the first setting, the classroom, reached a high criterion. It was decided that Phase II should continued until the subjects obtained a record of over 90% generalization in all five postural components over the entire thirty minute session for six consecutive sessions.

Results

By the twenty-fourth day of classroom training three subjects easily met the desired criterion. The remaining subject, Subject two, only reached approximately the 80% criterion. Three of her behaviors showed fair stability but the other two showed considerable variability. It seemed that she still needed the marked stimulus control of the

teacher's undivided attention to ensure her good performance. Since this subject had never previously performed in a classroom setting; (in fact any attempt to make her do so had led to self-abuse and attack on others), had never been token or peg-trained, and had refused to accept any form of edible reinforcement, it was decided to go on to the next phase. She was making considerable progress in the classroom and was now enjoying it. She would also provide an interesting comparison to the other subjects. Without such a high degree of generalization in the first setting would she show the same degree of generalization in other settings? Of further interest was the possible effect on her classroom performance of the lack of tight stimulus control and regularly operating contingencies in the other settings after the introduction of Phase III.

At this stage little generalization occurred from the classroom to the other settings. Certain gross motor imitations did seem to generalize in most subjects; e.g., in some subjects slouching and/or sprawling stopped occurring completely and in other subjects gradually decreased but bizarre positions of the hands and feet and "head down" behavior largely remained unchanged. The data on classroom generalization and dayhall pre and post-test generalization for all five component behaviors for Subject 1, Subject 3, and Subject 4 appear in Figure 1, Figure 2, Figure 3, Figure 4, Figure 5 and Figure 6 (Phase II). Subject two showed almost no generalization except within the classroom so no figure is included for her. Her degree of generalization within the classroom can be seen from her summarized data.

The summarized data expressed in Percentage of Correct Intervals (intervals in which the subjects showed correct postural behavior in all five components at the same time) is shown in Figure 7 and Figure 8 (Phase II).

GENERALIZATION: BETWEEN CLASSROOM TRIALS AND DAYROOM OBSERVATIONS

SUBJECT 1

HEAD DOWN

SPRAWLING

SLOUCHING

PERCENTAGE OF INCORRECT INTERVALS

POST-TESTS

CLASSROOM

PRE-TESTS

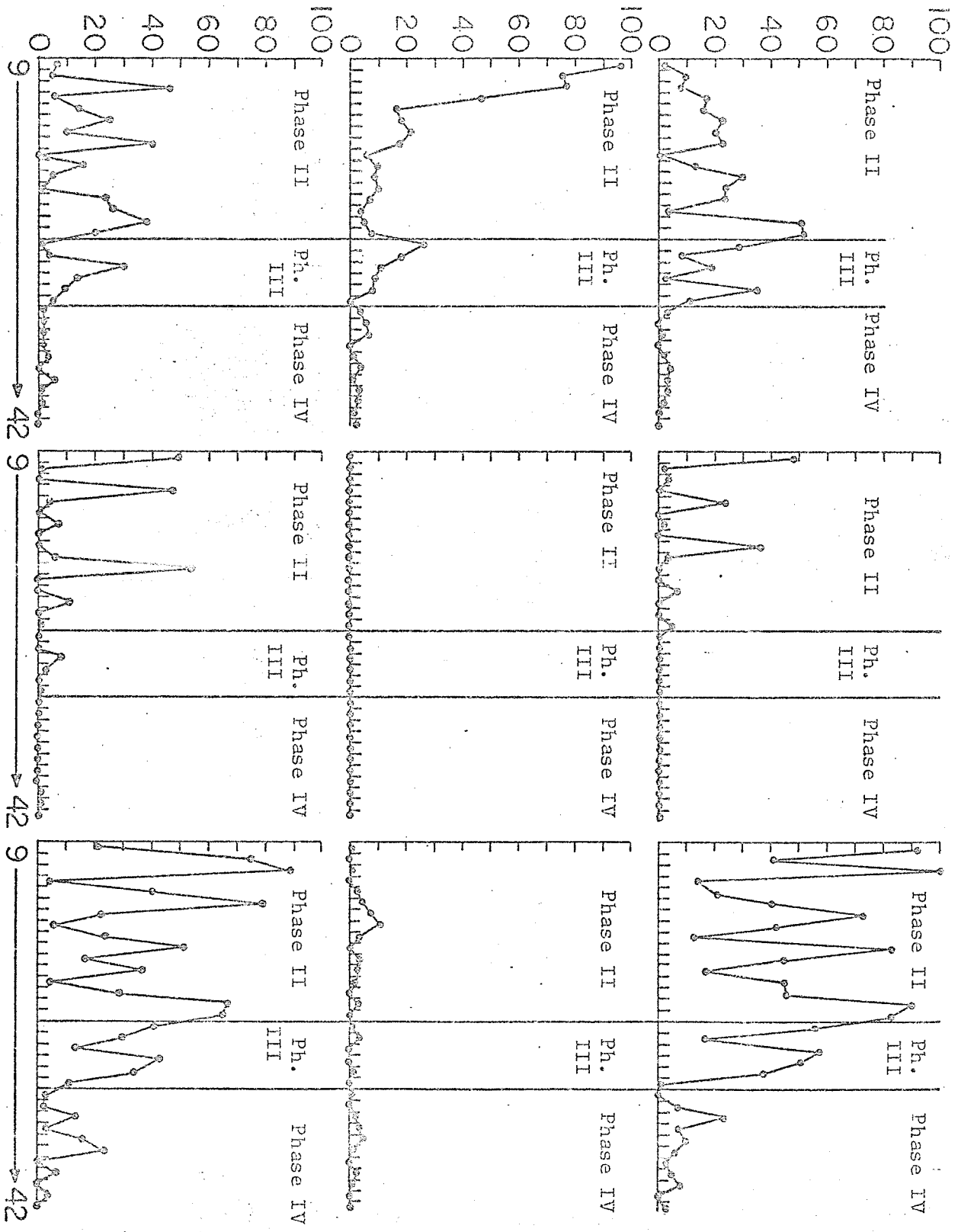


FIGURE 1 Generalization Data of S₁ of the EXPERIMENTAL DAYS

Down, Sprawling and Slouching in Pre-Test, Classroom and Post-Test Settings

SUBJECT 1

GENERALIZATION: BETWEEN CLASSROOM TRIALS AND DAYROOM OBSERVATIONS

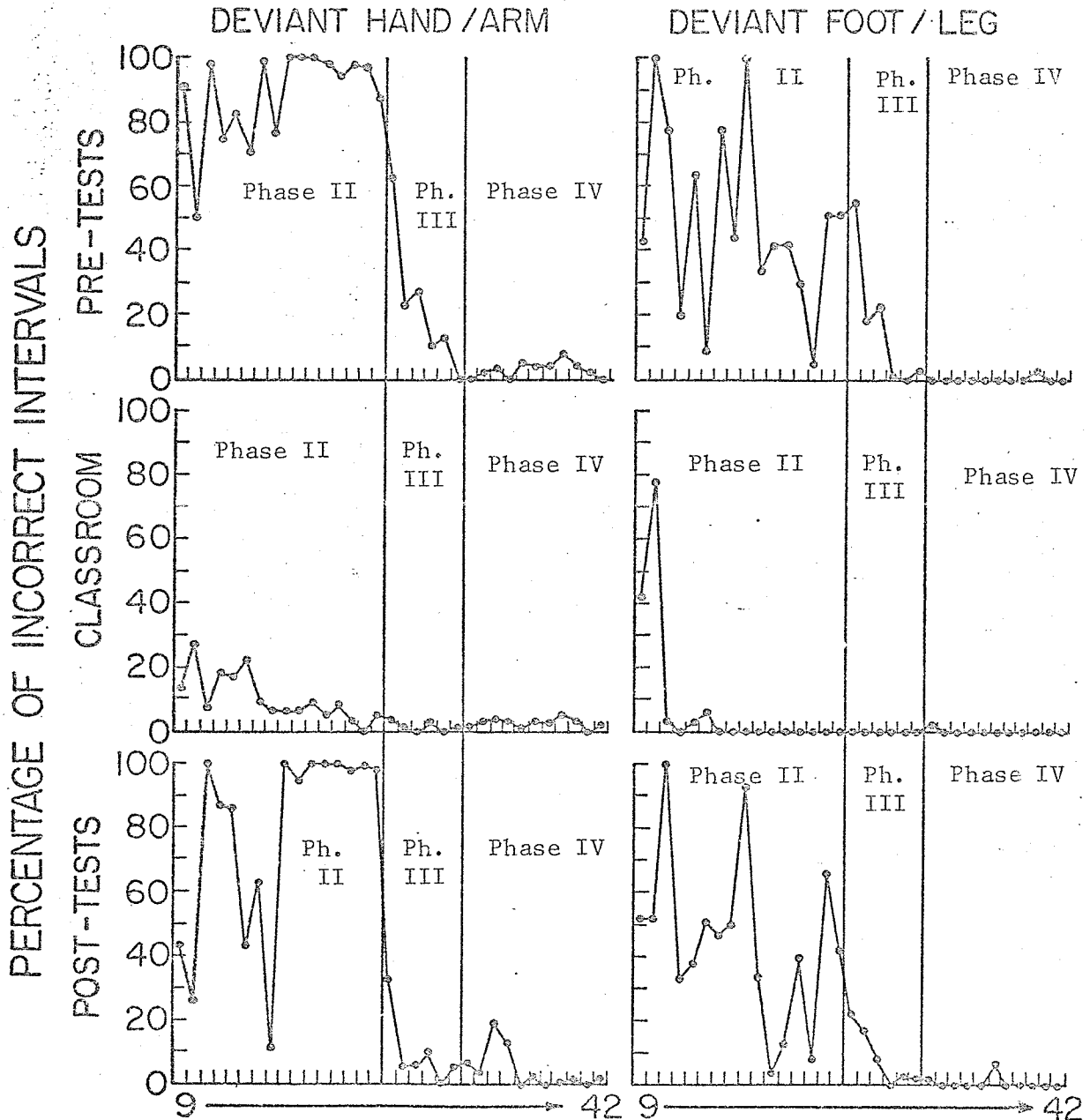


FIGURE 2
 Generalization Data of S₁
 of the Behavioral Components
 of Deviant Hand/Arm and Deviant
 Foot/Leg in Pre-Test, Classroom
 and Post-Test Settings.

GENERALIZATION: BETWEEN CLASSROOM TRIALS AND DAYROOM OBSERVATIONS

SUBJECT 3

HEAD DOWN

SPRAWLING

SLOUCHING

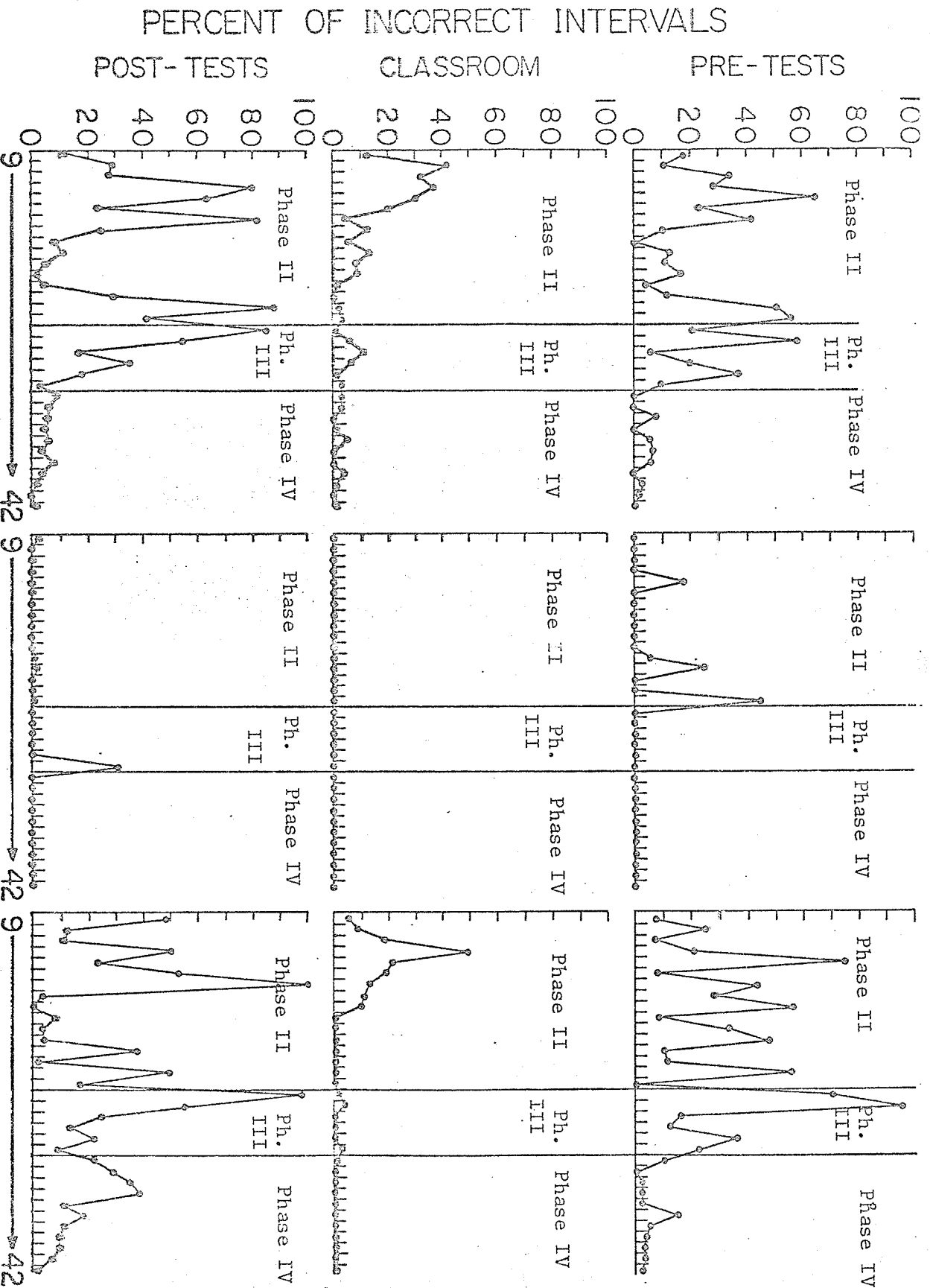


FIGURE 3 Generalization Data of S₃ of EXPERIMENTAL DAYS

the Behavioral Components of Head Down, Sprawling and Slouching in Pre-Test, Classroom and Post-Test Settings.

SUBJECT 3

GENERALIZATION: BETWEEN CLASSROOM TRIALS AND DAYROOM OBSERVATIONS

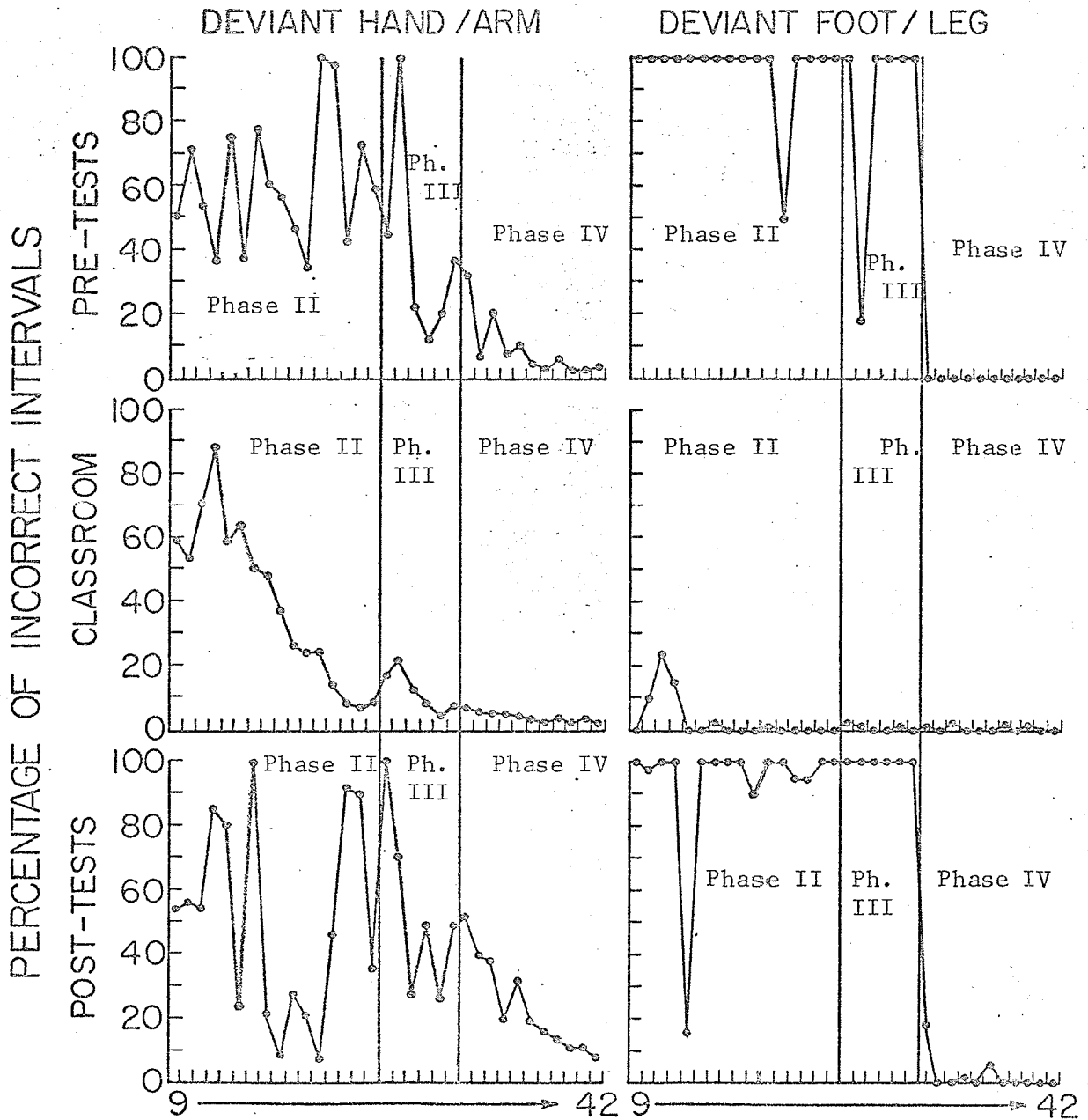


FIGURE 4 Generalization EXPERIMENTAL DAYS

Data of S₃ of the Behavioral Components of Deviant Hand/Arm and Deviant Foot/Leg in Pre-Test, Classroom and Post-Test Settings.

GENERALIZATION: BETWEEN CLASSROOM TRIALS AND DAYROOM OBSERVATIONS

HEAD DOWN

SRRAWLING

SLOUCHING

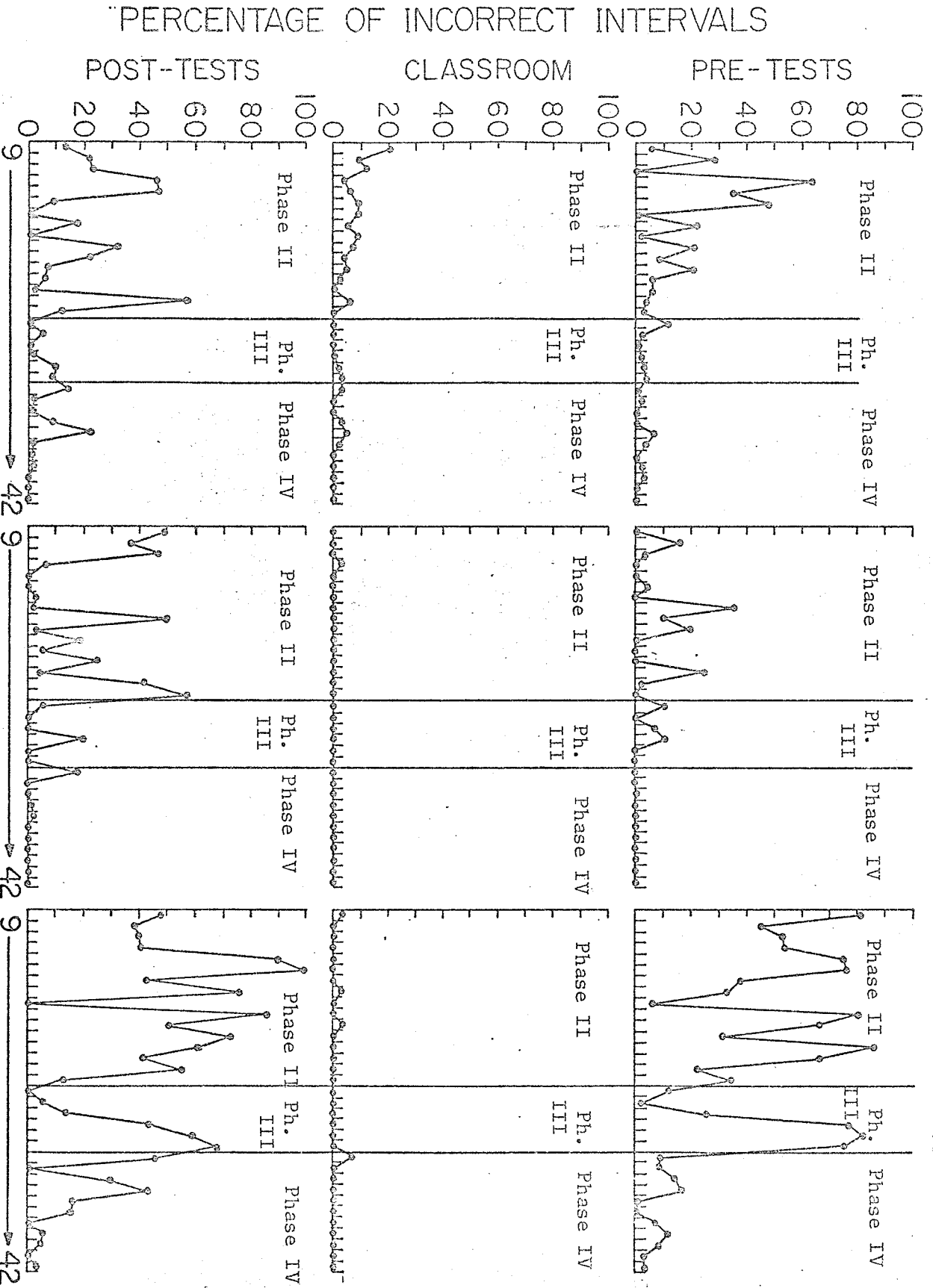


FIGURE 5 Generalization Data of S₄ of the EXPERIMENTAL DAYS Behavioral Components of Head Down, Srrawing and Slouching in Pre-Test, Classroom and Post-Test Settings.

SUBJECT 4

GENERALIZATION: BETWEEN CLASSROOM TRIALS AND DAYROOM OBSERVATIONS

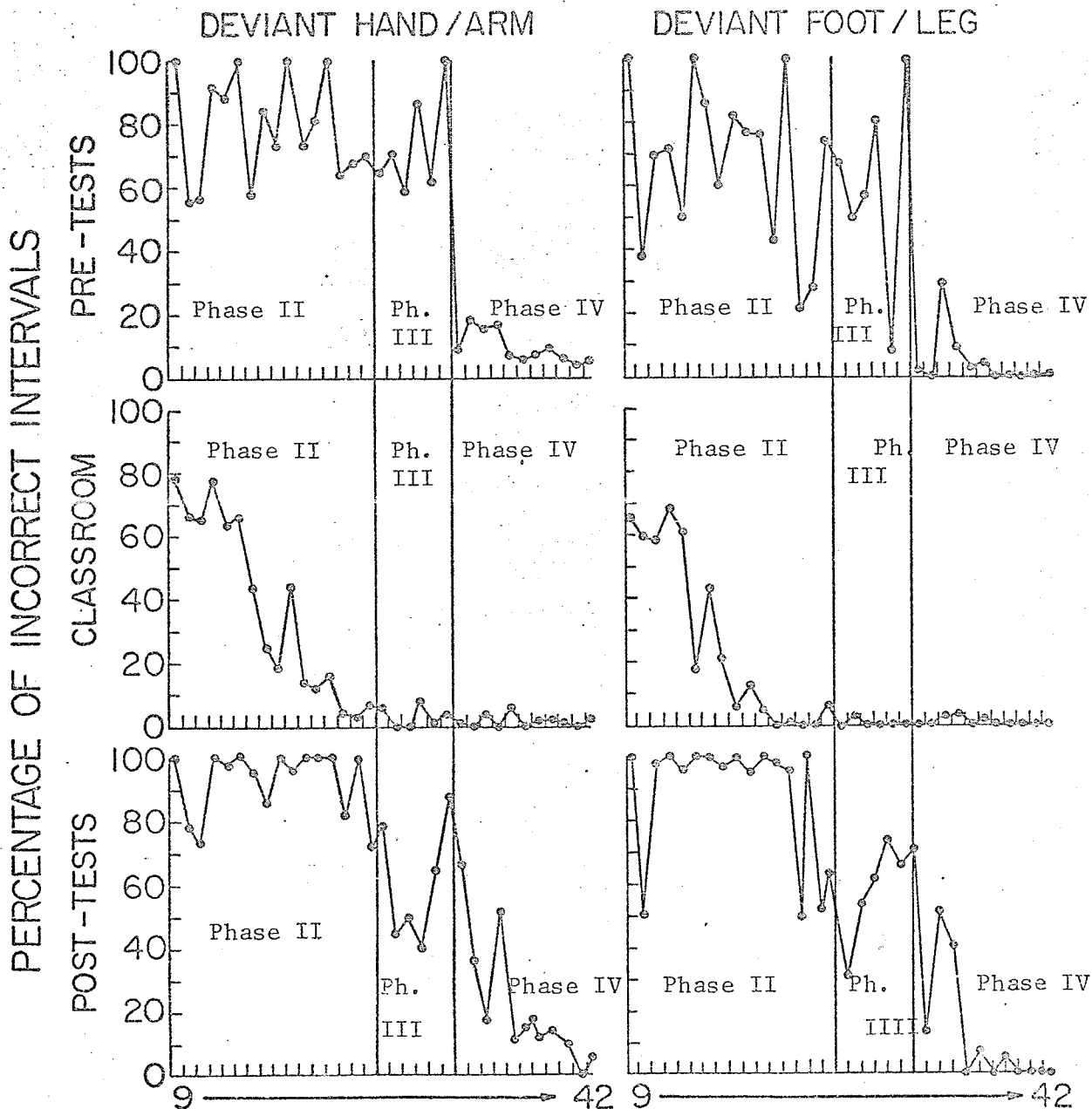


FIGURE 6 Generalization EXPERIMENTAL DAYS

Data of S₄ of the Behavioral Components of Deviant Hand/Arm and Deviant Foot/Leg in Pre-Test, Classroom and Post-Test Settings.

FIGURE 7. SUMMARY GRAPHS OF GENERALIZATION

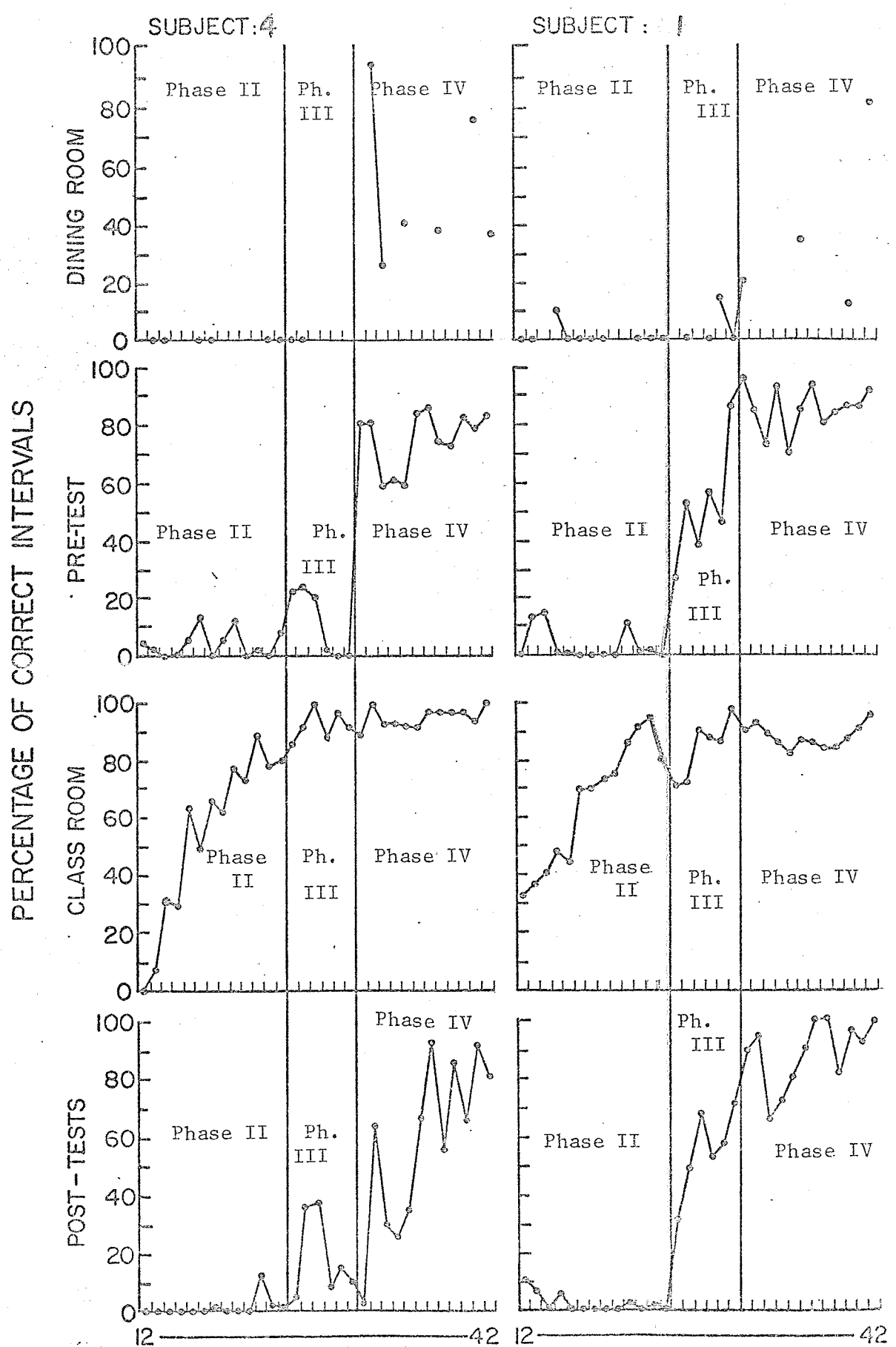


FIGURE 7 Summary Generalization Data of Perfect Posture of S₁ and S₄ in the Dining Room, Pre-Test, Classroom and Post-Test Settings.

EXPERIMENTAL DAYS

FIGURE 8. SUMMARY GRAPHS OF GENERALIZATION

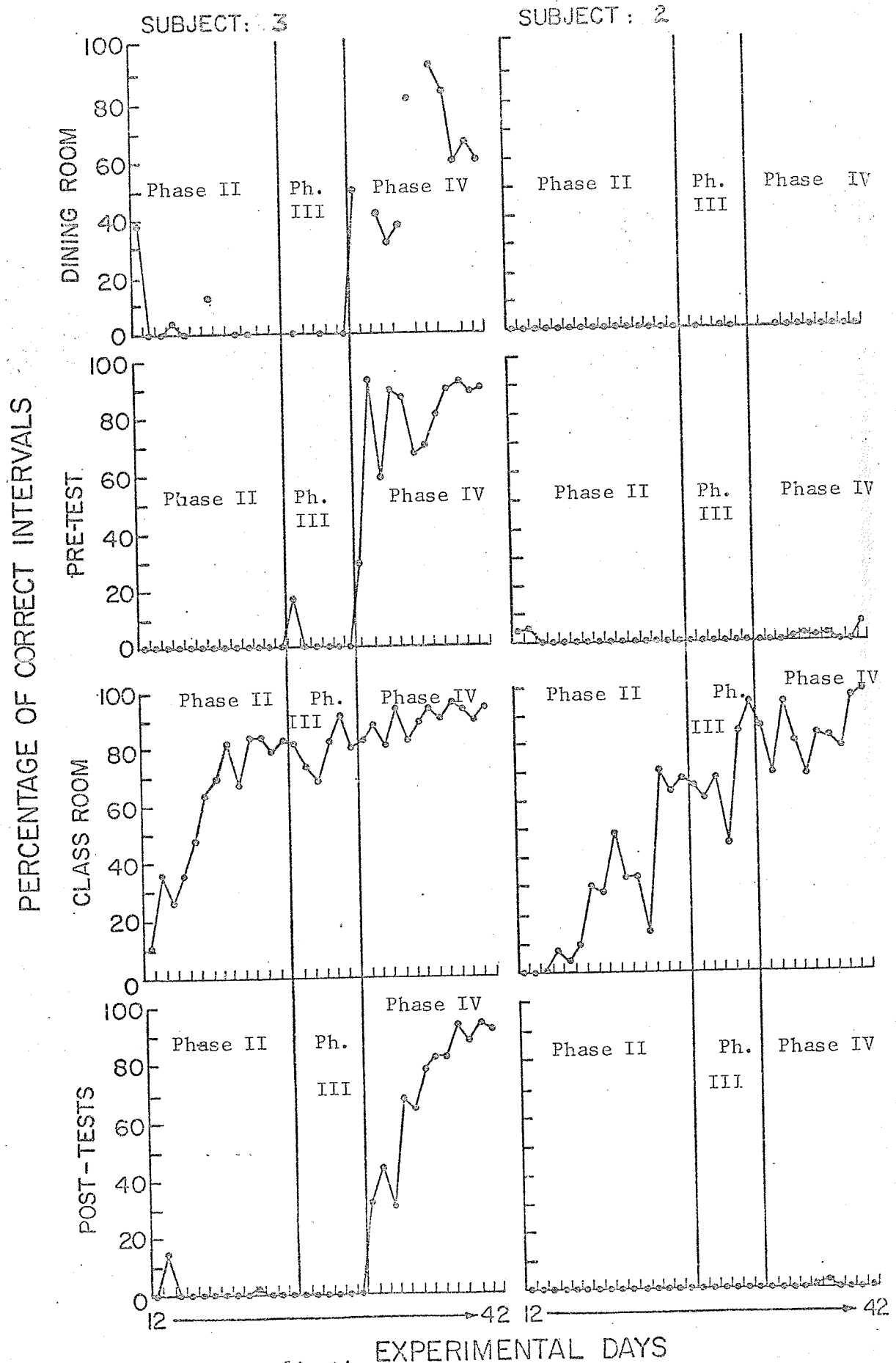


FIGURE 8. Summary Generalization
 Data of Perfect Posture of S_2 and S_3 in the
 Dining Room, Pre-Test, Classroom and Post-
 Test Settings.

Phase III

During this phase the experimenter entered the dayhall during pre and post-tests and modelled the correct behavior. No instructions were given, no reinforcement was given for good posture and no disapproval of any sort was shown for poor posture. As far as the subjects were concerned the teacher was not watching them and seemed completely unaware of any response they made.

Results

All subjects, with the exception of Subject two, showed some immediate, though often very transitory, improvement in performance. The posture of Subject two showed no signs of generalization from the classroom setting, just as in Phase II. Subject one showed improvement in posture and continued to maintain and increase this performance, with only minor variations, as long as observations were continued. Subject three and Subject four showed some improvement but its appearance and duration varied considerably. None of the subjects showed any change in performance in the third setting (the dining room) where no change in procedures had occurred. Each subject, with the exception of Subject two, will be discussed separately.

Subject one; the results on the performance of this subject as regards the behavioral components of Head down, Sprawling, Slouching, Deviant hand/arm and Deviant foot/leg are shown in Figure 1 and Figure 2 under Phase III. As can be seen from these figures the percentage of incorrect intervals in all five postural components dropped markedly both in pre and post-tests in the dayhall. There were some variations, from day to day, but the overall effect, as can be seen in the Summary Graph of Generalization, Figure 7, (Phase III) under Subject one, shows that this phase marked the beginning of increasing generalization in the dayhall during both pre and post-test situations.

Subject three; this girl showed considerable variability in her record of behavior. Unfortunately such records merely show the overall results of a fifteen minute pre or post-test. Only the anecdotal account kept by the teacher can fully describe her behavior. During the first pre-test, when the teacher entered the dayhall, this subject maintained perfect posture for precisely seven minutes. Thereafter, for the rest of this pretest, she exhibited all the poor posture previously shown to an even greater extent than before. On the next two days she tried again to maintain good posture, especially during the post-tests, but in the absence of any contingencies her performance showed considerable variability, showing little, if any improvement, over the performance observed in Phase II. See Figure 3 and Figure 4 (Phase III) for her performance during this phase as regards the behavioral components of Head down, Sprawling, Slouching, Deviant arm/hand and Deviant foot/leg. Though her performance overall showed little improvement, one rather dramatic effect is shown in Figure 4, Deviant foot/leg under Phase III (pre-test) which resembles the permanent change in this behavior shown in Phase IV, where contingencies were introduced. These present an interesting comparison to Phase II. Her summary generalization graph shown in Figure 8, under subject three, phase III, amply shows the overall effects of this manipulation on her performance. In the dayhall, during pre-tests, there is a small but transitory improvement in performance. During post-tests no overall improvement is shown.

Subject four; this subject showed more consistent results over the five postural components. In all five behaviors, as shown in Figure 5 and Figure 6 (Phase III), the percentage of incorrect intervals initially decreased but thereafter increased, over the rest of the six

day period in which this phase occurred, though in most cases not to the same high level as shown in Phase II. Nevertheless there was little doubt that if this "no contingency phase" continued the overall gain in performance would be nil. Her summary generalization results are shown in Figure 7, under Subject four, phase III, and amply demonstrate the truth of this conclusion. Here we seen an initial increase in the percentage of completely correct intervals followed by a gradual decrease to almost the same percentage as shown in Phase II. This subject throughout the latter part of Phase III exhibited an interesting flurry of related postural behaviors which seemed to resemble an extinction phenomenon. She successively sat up straight, put her head down, slouched, sprawled and finally lay down. She constantly repeated these maneuvers, seemingly to gain the teacher's attention. Unfortunately such details do not show in an overall record of posture as collected by the observers. Hence though her results, more or less, returned to those shown in Phase II, her behavior differed considerably.

Since it was obvious that, with the exception of Subject one, the mere presence of the teacher was not sufficient to program any lasting generalization, Phase IV was begun after six days.

Throughout Phase III classroom performance continued as before, in fact the subjects (sometimes after a brief drop in performance) showed increasing generalization in this setting with the exception of the one subject who showed such a high degree of generalization in the dayhall. Her classroom performance, though it remained high showed some slight variation. This could well be explained by the fact that she was now "sitting up straight" for two one hour periods each morning and afternoon. The behavioral definitions required such a high degree of good sitting

posture that any slight interval of slouching or relaxation could well be understood. For results see figures already referred to: Phase III.

Phase IV

In this phase the experimenter again continued the normal classroom training and was present in the dayhall during both pre and post-tests. Since the minimal programming necessary to produce setting generalization was the topic of interest, it was decided that verbal instructions and social reinforcement only would be used. These were given during the pre-tests and on a variable interval schedule throughout the day. Five variable interval schedules, ranging from a VI 15' to a VI 35' schedule, were drawn up ahead of time. Each day, one of these was drawn at random and the teacher entered the dayhall according to the schedule, and reinforced those residents showing good posture with praise, conversation, smiles, physical contact, etc. Poor posture was ignored. Time spent in the classroom, during pre and post-tests and in the dining room was not included. Hence even a VI 15' to VI 35' schedule meant that in the remaining time, from 8:45 A.M. till 5 P.M., the residents received a rich, though variable, reinforcement schedule. During the post-tests the teacher was again merely present but gave no instructions or reinforcement. She was seemingly unaware of the subjects' behavior.

Results

Subject two still showed no generalization from the classroom to other settings. The other three subjects showed a more or less immediate increase in generalization in the second setting, and, at the same point in time showed a lesser but marked degree of generalization in the third setting (the dining room). Each subject, with the exception of Subject two, will again be discussed separately as far as details of performance are concerned.

Subject one; this subject showed immediate improvement in all five behavioral components; Head down, Sprawling, Slouching, Deviant hand/arm and Deviant foot/leg, immediately after the introduction of Phase IV, as shown in Figure 1 and Figure 2, Phase IV. Thereafter her behavior showed some slight variability, but the figures leave us in doubt that for her continuing improvement in generalization would occur. Her summary generalization as shown in Figure 7, phase IV, confirms this impression. This was the girl who showed no set back in the latter part of phase III and who seemed to respond merely to the presence of a significant model demonstrating the desired behavior. Nevertheless the introduction of instructions and contingencies into the second setting seemed to hasten the increase in generalization in the second setting and occasion generalization in the third setting.

Subject three; this girl also showed immediate improvement in Phase IV with one exception, percentage of intervals in which slouching occurred showed a temporary increase during post-tests. This was the time in which the teacher gave no instructions or reinforcement. This subject had previously spent her time with her legs tucked under her, back held rigidly straight, while she rocked back and forth. When her feet were placed correctly on the floor, or her legs crossed, and her hands in her lap, this rocking behavior ceased but there was a temporary increase in slouching as she relaxed the rigid back-position maintained during rocking. A brief instruction from the teacher during pretests; namely, "put your shoulders back", corrected this fault but during post-tests it took until the fifth day for this "shoulder-back, no slouch position" to generalize. These results are shown in Figures 3 and 4 under phase IV. Her summary generalization data as shown in Figure 8, phase IV, shows a very marked increase in completely correct sitting posture and provides a strong contrast

to Phase III in the same figure. For this subject, the introduction of instructions and contingencies into the second setting marks the beginning of real generalization to other settings; both the dayhall and to a lesser extent the dining room.

Subject four; this subject also showed immediate improvement in phase IV in Figures 5 and 6. Again there was some variability in performance, especially during post-test but overall her generalization in all five postural components increased rapidly. Her summary graph; Figure 7, phase IV, amply supports this statement.

Performance continued to show a marked improvement in both tests. At times, however, the data and graphs showed considerable variability. The anecdotal account kept throughout the study suggested explanations for the day to day variations as being beyond experimental control in this setting. Some examples were, for instance, the intrusion of loud dance music over the intercom system, which, though enjoyed by many residents, did little for the "sitting posture" of a subject with a sense of rhythm and a desire to dance; as another example, a television set with cartoons playing and a subject sitting at its side inevitably led to the behavior scored as slouching. Similarly the occurrence of a larger resident sitting on a subject's knee which not uncommonly led to a record of sprawling did little to contribute to data stability. People present in the dayhall during tests varied from twenty-five residents and sixteen staff to nine residents and no staff with occasioned a considerable variation in noise level and subsequently in the concentration shown by the subjects.

In spite of the fact that at times the experimenter felt somewhat trapped by her own behavioral definitions of good posture, there was no

doubt that in this phase the connection between good posture, and reinforcement was established as applying in all the settings observed.

Phase V

The procedures and observations continued in the classroom, dayhall, and dining room as previously described.

In addition video tapes were taken in the dayhall setting from 9 - 10 A.M. for five consecutive days (day 44-day 48 inclusive). Many students, staff and residents were present in this setting during this hour. Students were observing the residents in this study during the morning pre and post-tests, while other students were conducting observations on other residents who were subjects in two other these studies which were running concurrently. Many staff were also present at this time since it included the morning coffee break. Most of the cottage residents were present and since the green light was on (this was an S^D for quiet behavior from the residents and a reminder to staff to intermittently reinforce good behavior) they remained seated. The video-tape camera, using a wide angle lense, was continually focused on different areas of the room for consecutive time periods so that as many people could be filmed for as long as possible each day.

Recordings were also made of people in other normal situations by the student observers. Where possible they used the tape-recorder with the ear plug and the usual data sheet and appeared merely to be "taking notes". In situations with other student friends who tended to ask questions, but who knew nothing of this study, they explained that they were conducting an experiment but gave no indication of what they were recording. Many recorded on their parents, who merely considered their behavior part of their normal studies.

On most occasions their behavior seemed to occasion little interest or concern and they experienced few difficulties. Where the presence of the tape recorder seemed unusual they used their watches to time the observe-record intervals.

Results

Video tapes were later rerun and scored using the usual observe-record tape and Data Sheet I. Most of the intervals recorded of any one individual however seldom exceeded 5-8 minutes. The percentage of correct intervals was then worked out in the usual manner.

In addition a video-tape of a panel discussion held at the University of Manitoba was viewed and scored.

The direct records obtained by the students of family, friends, people in public waiting rooms, etc. were scored from the data form directly, exactly as was done for the subjects.

The highest score obtained by either method was 28.6% good posture. At this point the girls were regularly showing over 90% correct posture in the classroom and 70% was considered a poor score in the dayhall. Dining room records showed between 40-90% correct posture.

Since the study had been undertaken to develop "normal" acceptable posture, as shown by an average member of the general public, it was obvious that we should now lower our criterion for good posture for the ongoing intermittent reinforcement program that the staff had promised to undertake.

The fact that the gross behaviors of slouching and sprawling had almost disappeared and that they now held their heads upon most occasions and readily made eye-contact with anyone who approached them was most valuable. Positions of hands and feet as long as not bizarre or aesthetically displeasing could be allowed to show considerable variation.

A summary of the Phases and Results appears in Table 3.

Table 3

SETTING (1) THE CLASSROOM

SETTING (2) THE DAYHALL

SETTING (3) THE DINING ROOM

Phase I	<p>The Evaluation of Classroom Procedures</p> <ol style="list-style-type: none"> 1. Modelling 2. Development of an imitative repertoire 3. Fading 4. Shaping 5. Teaching each separate component 6. Response to "sit up straight" 7. Increasing duration 8. Meeting criterion for Phase II (no physical guidance only two prompts), 100% trial performance at 20 secs. duration for last 6 sessions 		
Phase II	<p>The Development of Generalization</p> <ol style="list-style-type: none"> 1. Method used - Intermittent RFT 2. Way of measuring 3. Results - INCR. Gen. 4. Criterion for Phase III over 90% generalization in all five behavioral components 	<p>Pre and Post-Tests - 4 per day</p> <ol style="list-style-type: none"> 1. Method 2. Results (few except for gross motor responses such as slouching and sprawling) 	<p>Moan Hour Observations</p> <ol style="list-style-type: none"> 1. Method 2. Results - none
Phase III	<p>Classroom as Before, Increasing Generalization</p> <p>All subjects now acted as if having a trial on almost all occasions</p>	<p>Pre and Post-Tests as Above</p> <p>Teacher in dayhall modelling Correct Posture. No instructions. No. Rfint.</p> <p>Results</p> <ol style="list-style-type: none"> 1. S₁ - beginnings of generalization in dayhall. No set-backs. 2. S₂ - no results 3. S₃ - Behavior improved but very briefly 4. S₄ - some effect on behavior but soon poor behaviors began to reappear 	<p>Moan Hour Observations</p> <p>Results</p> <p>No Generalization</p>

	SETTING (1) THE CLASSROOM	SETTING (2) THE DAYHALL	SETTING (3) THE DINING ROOM
Phase IV	As Before	<p>Teacher present during Pre and Post-Tests</p> <ol style="list-style-type: none"> 1. During pre-tests - instructions and social rfmt. 2. Intermittent rfmt on VI schedule throughout the day 3. Post-test - only modelling <p><u>Results</u> All subjects except Subject 2 showed immediate and lasting improvements in both pre and post-tests.</p>	<p>As before.</p> <p><u>Results</u> A lesser but marked degree of generalization. This coincided exactly with the onset of Phase IV</p>
Phase V	As Before	<ol style="list-style-type: none"> 1. As before, but accompanied by frequent videotaping. 2. Recording on normal and varied groups of subjects to help determine a realistic code for ongoing intermittent rfmt. Highest score 28.6% correct 	As Before

PERHAPS MOST IMPORTANT OF ALL - ONGOING INTERMITTENT RFMT

FROM COTTAGE STAFF FOR GOOD POSTURE AS IT OCCURS

CHAPTER IV

DISCUSSION

A. Discussion of Subjects

From the results shown in this study it is obvious that three of the subjects showed a high degree of setting generality. Subject one, Subject three and Subject four all displayed the learned behaviors in other settings. The point at which this occurred however varied from subject to subject. Of greatest interest was the power of the contingency in the behavior of each subject.

Subject one showed signs of generalization earlier than all other subjects. At the onset of Phase III, the entrance of the teacher into the dayhall, her behavior in both pre and post-test showed an improvement in spite of the fact that no contingencies were operating and no instructions given. Unlike that of the other subjects her behavior showed no set-back in the later part of this phase. Her posture continued to improve throughout the study. During intermittent reinforcement in Phase IV, the teacher never entered the dayhall while this subject was sitting but she found her trying to conform to the correct postural criterion. The implications of this subject's behavior are discussed in more detail later in this chapter.

Subject two, the subject who showed lowest generalization in the classroom setting and who subsequently seemed less ready for a test of setting generality, did indeed produce poor results in the dayhall and generalization to the dining room did not occur. This substantiates the view that until one accomplishes complete generalization in the first setting it is probably futile to expect any results in different settings. It does not explain, however, why in the later part of the study, when

generalization was high in the classroom setting, there was still so little transfer of training. These results may well have been slightly confounded by the fact that this girl showed considerable avoidance behavior throughout the day. She was known as a "loner" and seemed to feel extreme discomfort while being observed. Her performance during tests was much poorer than the general behavior displayed by her when she was observed during intermittent reinforcement. Subjectively her performance did show improvement in the second and third settings but still did not meet the behavioral definitions used so such progress could not be measured accurately and quantitatively. As summed up by one observer-"she still does the same things, but much less so". For instance at the end of the study she still showed the behaviorally defined sprawl but this was no longer such a gross behavior as it had been earlier and now had to be watched for more carefully. Her results, however, definitely support the premise that setting generality may well not appear in new settings unless preceded by high generalization within the first setting.

Subject three showed a high degree of generalization in the dayhall and to a lesser extent in the dining room. In her case however the power of the contingency was the effective mechanism. On the first entrance of the teacher into the dayhall she showed perfect performance for exactly seven minutes. By then she appeared to have assessed the situation and realized that no contingencies were operating. On the second day of this phase she tried again and showed almost perfect behavior for one entire test (fifteen minutes). No reinforcement followed and throughout the rest of this phase neither pre nor post-test showed very marked improvement compared with her previous performance. In Phase IV her performance vastly improved in pre-tests. Her results though showing

steady improvement in post-test lagged behind the pre-test records. During intermittent reinforcement she often showed reasonable posture when the teacher entered the dayhall but the most noticeable thing was that within a few seconds (one to five seconds) after her entrance this subject had adjusted her position as quickly as possible and soon showed perfect posture. Indeed it was extremely difficult to reach her to correct any faults before she had made such adjustments herself. This seemed to demonstrate a high degree of stimulus control.

Subject four, like Subject one, showed early signs of setting generality. Her performance during Phase III was most interesting and perhaps most worthy of further analysis. On the entrance of the teacher into the dayhall she showed immediate improvement in both pre and post-tests. This effect lasted for two day or eight tests. From then on in this phase she exhibited a typical extinction flurry of related postural behaviors. There was no noticeable change in other behavior such as verbal behavior, aggression, etc. She never attempted to get up and walk away. She started each test by displaying perfect sitting posture, then her head dropped, and she glanced up to see what reaction this response would bring. When nothing happened she subsequently slouched, sprawled, spread her arms and legs far apart and eventually lay down. She repetitively repeated this behavioral cycle for the remainder of the test. Unfortunately the summary figures and graphs do not show this behavior in detail. They merely show poor test results. The anecdotal record makes the analysis of these results meaningful and interesting.

In Phase IV her performance improved in both pre and post-tests, but results in pre-tests slightly excelled those obtained in post-tests. In this phase generalization to the dining room also occurred.

B. Explanation of Unusual Results

In an overall review of the results it is interesting indeed to compare the performance of Subject one and Subject four. Both these subjects showed a high degree of generality. Their graphs (especially the summary graphs, showing the percentage of perfect posture) and data show a difference in Phase III but from then on their results are very similar but their behavior seemed to be controlled by different processes.

Subject one to whom the presence or absence of the contingency seemed of little importance demands some explanation. Her behavior throughout the day requires further analysis.

At first it seemed easy to explain her performance during Phase III in terms of the teacher's presence in the dayhall. Here an adult who had always been associated with positive reinforcement for good posture may well have acted as a secondary reinforcer. She had, however, received exactly the same classroom training for the same length of time as the other subjects so we are still left to wonder why she should react differently. Furthermore her extremely good posture in the teacher's absence seems to exclude this explanation. To her it seems "matching to a sample" became intrinsically reinforcing. Baer and Sherman (1964) reported a similar phenomenon when they developed an imitative repertoire as a means of producing speech in severely retarded subjects. In the animal literature a similar finding is well substantiated. In a study by Herrnstein and Loveland (1964) pigeons reinforced for matching to a sample showed that such matching acted as a conditioned reinforcer. Since this matching is immediately followed by positive reinforcement, such a finding follows from the procedures for establishing conditioned reinforcers. In this study subject one had received extensive training in the classroom setting where matching to a sample consistently preceded reinforcement.

The varied behavioral topography displayed by Subject four in the dayhall during Phase III makes an interesting comparison. From her behavior, this phase could well be viewed as an extinction. The teacher who had consistently reinforced good sitting posture in the first setting now paid no attention to this behavior in the second setting. This was tantamount to putting the subjects on extinction. Subject three though she did not present such an obvious display of postural behavior, showed similar results in her records.

The subsequent introduction of the contingency during pre-tests and during intermittent reinforcement was sufficient to maintain the behavior of Subject four (and also Subject three). Here the contingency obviously controlled the behavior throughout.

Both these possible explanations for good posture would suggest that occasional intermittent reinforcement be given to the subjects for some time to come. In one case it will maintain the contingency controlling good posture and in the other maintain the conditioned reinforcer of "matching to a sample".

C. Identifying Variables Controlling Behavior

Considering these results, it seems obvious that some degree of programming may well be necessary to ensure setting generality. As emphasized by Baer et al (1968) and Lent (1970), it is frequently not sufficient to modify behavior in one setting and then assume that the newly acquired desirable behavior will occur in all settings.

If a subject's behavior is principally a function of its short-term consequences and antecedents then one could argue that behavior is situation specific. A subject's behavior in various settings should conform to the contingencies acting in these settings. Only if similar

contingencies of reinforcement exist in new settings can we assume that generalization will occur. This of course is an oversimplification. Frequently new adaptive behavior, which is originally reinforced with a token or a candy, may subsequently be reinforced by certain other unplanned or natural reinforcers in the environment. In this category would fall Baer's examples of priming and trapping (Baer, and Wolf, 1967). For instance, if a child is deliberately reinforced for approaching other children and learning to interact successfully with them, the subsequent naturally reinforcing effects of being accepted by others and the interest involved in mutual play may well take over the contingency of reinforcement. Similarly, one would suspect that if a subject is taught to hold her head up and subsequently sees many interesting things happening around her, further programming might be unnecessary. In other cases, however, natural reinforcers may not originally be present in the subject's environment. Then it might well be necessary to program some form of reinforcement for the new behavior in the new situation.

In this study in the dayhall environment there were few natural reinforcers for "head-up" behavior. The windows, though large, were well above eye-level when the subjects were seated. In order to see outside they had to stand up and approach the window. There was a shortage of seats in the dayhall when most residents were present and some, usually the smaller ones, who occasioned more interest from the older girls, sat on the floor. Therefore to see other residents a subject could look up, or more likely down. The television set was another thing to watch especially while cartoons or musical programs were on, but this sat on a very low table and in order to view it from a chair or couch a subject had

to look down. Interesting stimuli in this room were minimal. Furnishings were strictly functional and decorations, pictures, etc. were noticeable only by their absence. There was no sign of any personal possessions, no toys and no books or magazines were ever present. The room was always clean and "neat" in the extreme to the extent that it was hard to believe that this was the main indoor relaxation area for twenty-seven people. Considering the setting it is easily seen why some contingencies to reinforce "head-up" behavior had to be engineered.

In a quasi experimental situation where pre and post-tests are carried out many competing behaviors in different settings may interfere with the adequate quantification of generalization in these settings. These competing behaviors may be highly desirable in their own right but an adequate measure of setting generality is difficult to achieve unless the subjects can be constantly observed throughout the entire day.

In the present situation completely contingent reinforcement for good posture was given by the experimenter in the classroom, but in the dayhall she had to follow the dictates of the Phases. The many other adults present were presumably reinforcing other desirable behaviors and in the course of this task, frequently inadvertently reinforced poor posture. At other times reinforcement for these other behaviors coincided with the occurrence of good posture. Other situations frequently occurred which accidentally approximated the punishment of good posture. For instance a resident being tested in the dayhall, because it was necessary for her to remain there for fifteen minutes, might well be displaying perfect posture when the opportunity to participate in a very reinforcing event such as a trip downtown, a swim in the pool or some time in the playground arose. Then she heard the announcement - "Let's

all get ready and go out". When she rose from her seat she was told, "You can't go, X! Go back and sit down".

It is difficult to disentangle the effects of these occasions. Undoubtedly such "mixed contingencies" affected the performance of the subjects in the second and third settings. In a recent study by Redd and Birnbrauer (1969) it was clearly shown that an adult, through being paired with contingent reinforcement, acquired discriminative properties and functioned as a discriminative stimulus for a particular behavior in many settings; i.e., an adult who dispensed reinforcement contingent upon a particular response in one setting came to control the behavior of the subject in subsequent settings. The subject's behavior in various settings changed with the onset of the discriminative stimulus (the entrance of the adult into the particular setting). Another adult who dispensed non-contingent reinforcement did not acquire such control.

A follow-up study by Redd (1969) compared the effects of an adult who applied completed contingent reinforcement, one who applied non-contingent reinforcement and one who applied "mixed" reinforcement; contingent and non-contingent. The results clearly indicated that the completely contingent adult affected the behavior of the subjects in all settings, within forty-five seconds after her entrance, the non-contingent adult had no effect on their behavior and the "mixed" adults' effect was unpredictable depending on her initial behavior.

These findings throw considerable light on the behavior of the subjects in this study. All three types of discriminative stimuli were presented to the subjects. Most of the adults who were present in the second setting showed non-contingent behavior towards good posture.

A few who became interested in the displayed behavior of the residents found good sitting posture either interesting enough to reinforce, or inadvertently reinforced it because it is also accompanied by quiet and restful responses. Other adults entered the category of the "mixed" adult as they reinforced other desirable behavior irrespective of any posture shown. Even the teacher, due to the dictates of the experimental phases, became a "mixed" adult. She consistently reinforced good posture in the classroom, during pre-tests and intermittent reinforcement but showed no concern or interest in good posture throughout the post-tests. The trends which clearly showed improving posture in the dayhall also show some variability which may well be explained by the above discussion.

In the dining room the same conditions probably existed with the exception of the teacher's presence. Any variability here is less easily analyzed as the experimenter could never be present in this setting. One very interesting result of the study was the sudden and spontaneous occurrence of generalization in this setting immediately upon the introduction of Phase IV in the dayhall setting. In considering why this should occur the two experiments by Kalish and Guttman (1958; 1959), which showed that their procedure of training at more than one stimulus value resulted in a widening of the generalization gradient, immediately come to mind. To hypothesize rather widely this might explain why in the present study once some contingencies were introduced in the dayhall, generalization occurred spontaneously in the dining room. It might possibly also explain Baer et al's (1968) finding that once treatment has been instituted in only a few situations, widespread generalization then frequently occurs.

Over different diagnostic conditions the study and classroom training showed equivalent results. Subject two, the only subject who did not show extensive generalization outside the classroom, should not really have been included in such a study. Unfortunately she was difficult to manage and a program using only positive reinforcement seemed suitable to her needs and some form of classroom training seemed very desirable. Considering the degree of generalization that she reached in the classroom there seems little doubt that with further exposure to similar contingencies she too will show setting generality.

In any future test of such setting generalization a more rigid system, in which extraneous variables were better controlled, would be desirable. As Baer et al (1968) stressed there should be no intrinsic difference between pure and applied research. But the applied researcher achieves equal experimental control only over formidable difficulties. Many interfering variables such as the number of residents and staff present in the various settings during tests, the intrusion of T.V. and radio programs, and the non-contingent reinforcement given by other adults might prove possible to control in the future. When this is done more reliability data which shows less variability should be obtained

D. Suggestions for Future Research

It is also possible, though the figures and results show no substantiation for this theory, that extensive and consistent classroom training might in itself have eventually produced setting generality. The use of a control group, similar in attributes to the experimental group, who only received prolonged classroom training throughout the entire study while dayhall manipulation were applied to the experimental

group would have provided a definite answer to this possibility.

Various other clarifying manipulations would have been possible if more subjects had been used. For instance one group might have been treated like these four subjects, while another group received both classroom training and at the same time intermittent reinforcement in another setting throughout the entire study. A comparison of the progress of the two groups would have helped to answer the question as to whether generalization occurs more quickly once a behavior is well acquired in the first setting or whether simultaneous training in two or more settings would indeed produce a widening of the generalization gradient and bring about quicker and more widespread generalization.

The possibilities are almost endless and would help answer many practical questions which have bearing on the future training of residents.

It also seems desirable that such a training program as this, should at a later date, be followed by a post-check to see how much remains of the summer training program and to ascertain whether the occasional intermittent reinforcement given by staff members is sufficient to maintain the behaviors.

E. Subjective observation - Desirable side effects

This training period showed various desirable "side effects" for the residents involved. First and most important was the increase in their attention span. In this regard, the behaviors taught seem of secondary concern compared to the consistent application of operant principles. As long as such principles are applied, and the correct contingencies are regularly in operation, the attention span of the

subject gradually and lawfully increases. This gives them an essential pre-requisite behavior for further classroom training. These subjects had a very short attention span recorded in their latest psychological assessment, a few seconds in the case of Subject one and Subject four and less than one second in the case of Subject two and Subject three. Throughout the later part of the classroom training, each trial consisted of twenty seconds of perfect posture and attention to the teacher. In addition they showed almost constant attention between trials. In the dayhall setting, in spite of many competing behaviors, their ability to concentrate on their posture frequently persisted for a fifteen minute test with very few lapses.

Appropriate verbal behavior increased throughout the summer. There is little incentive to talk when no one listens. Throughout this period of time the teacher encouraged simple verbal communication with the subjects. The two students who conducted the walking program similarly displayed friendly interest in their efforts to talk. The many other students present in the cottage, some of whom acted as observers, came to know the subjects well, greeted them whenever they encountered them and took a few minutes to listen to any verbal behavior displayed.

Since the teacher frequently smiled at the subjects during good performance, smiling became a much more noticeable behavior in their repertoire. Towards the end of the study the subjects spent an increasing proportion of their time smiling at the teacher. Subsequently they smiled more at each other and laughed together when any little incident amused them. Subjectively each one seemed to become part of a group and objectively they tended to sit near each other in the dayhall and showed pleasure when any member of the group was reinforced.

In future before any similar study is undertaken it would be highly desirable to establish a truly realistic behavioral criterion for good posture. The behavioral definitions used in the classroom and during early generalization tests must be very specific and highly demanding. Without this no quantitative assessment would be possible. Nevertheless a more realistic assessment of what constitutes acceptable posture must be developed for any follow-up intermittent reinforcement. In this study the recordings taken of normal adults in various situations showed the postural behavior of the subjects as vastly superior to the norm. With the cessation of all formal training however it is likely that the subjects will show less rigid posture. To expect them to maintain such behavior indefinitely would be unreasonable. What is ultimately desired is that they display appropriate posture in various different settings.

Overall the classroom program proved highly successful and the degree of generalization shown, a source of satisfaction. Considering that this group of residents had shown the very worst of posture due to biological defects, early childhood deprivation and injury, and many years of merely custodial care, and that they were so profoundly retarded, the indications are that such a program could be advantageously applied to many residents.

Of course this is merely an assumption which must be put to the test. At the moment it seems likely that if such a program could be applied to younger residents, preferably in conjunction with a physical education program, we might well do a lot towards elimination of the "retarded walk and posture syndrome".

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