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THE ENTRY INTO NATURAL COMMUNITIES OF REINFORCEMENT.

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THE PRESCHOOL IS A COMMUNITY OF REINFORCEMENT CONTINGENCIES WHICH WILL SHAPE AND MAINTAIN AN INCREASING REPERTOIRE OF SOCIAL BEHAVIOR AND WILL PUT THAT BEHAVIOR UNDER THE CONTROL OF PEERS. THIS STATEMENT WAS DEMONSTRATED IN A PROGRAM WHICH ANALYZED PROBLEM BEHAVIORS OF PRESCHOOL CHILDREN. IN GENERAL, THE PROGRAM CONSISTED OF TWO PROCESSES--(1) FORMAL, QUANTITATIVE RECORDING OF THE RATE OF BEHAVIOR UNDER STUDY AND ITS CURRENT CONTINGENCIES WITH TEACHER SUPPLIED SOCIAL STIMULATION, AND (2) EXPERIMENTAL MANIPULATION OF THOSE CONTINGENCIES. NOT ONLY DID BEHAVIOR CHANGE IN RESPONSE TO REINFORCEMENT, BUT IF THE TEACHER INTRODUCED A SUBJECT TO THE COMMUNITY OF MUTUAL REINFORCEMENT CONTINGENCIES AND LEFT HIM IN IT TOO LONG, THE TEACHER WAS UNABLE TO EXTRACT HIM AGAIN. THIS PROCESS WAS DEFINED AS TRAPPING A CHILD WITHIN THE PEER GROUP. THE ESSENCE OF THE TRAP WAS THAT ONLY A RELATIVELY SIMPLE RESPONSE IS NECESSARY TO ENTER THE TRAP. ONCE ENTERED, THE TRAP CANNOT BE RESISTED IN CREATING GENERAL BEHAVIOR CHANGE. A CHILD BECOMES TRAPPED BY PROMPTING SOCIAL BEHAVIOR WHICH REINFORCES HIM EACH TIME HE DISPLAYS IT, UNTIL HE ENTERS THE SOCIAL TRAP OF THE PEER GROUP. IT IS BELIEVED THAT THERE ARE OTHER COMMUNITIES OF REINFORCEMENT CAUSING BEHAVIOR CHANGES. THIS PAPER WAS PRESENTED AT THE ANNUAL MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION (WASHINGTON, D.C., 1967). (CG)

THE ENTRY INTO NATURAL COMMUNITIES OF REINFORCEMENT

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This paper was presented at the annual meeting of the American Psychological Association, Washington, 1967, as part of a symposium on Achieving Generality of Behavioral Change.

Deliberate behavioral change is becoming a familiar phenomenon in the study of behavioral development. Previously, whenever one more aspect of human behavior was brought thoroughly under experimental control, the fact was celebrated as yet another testimony to the lawfulness of behavior and the validity of psychology as an experimental science. Currently, demonstrations of thorough experimental control seem numerous and diverse enough to support the development of a technology of behavior to complement its science. Some research is focussing on the development of that technology, and a central problem which emerges is achieving generality of behavioral change.

Generality of behavioral change can be seen in a variety of ways. It can mean that the change brought about in one environment generalizes to other environments, such that a child whose stuttering has been eliminated in the clinic will also speak fluently at home and in the classroom. Generality can mean the breadth of the behavior class changed, as when a child who has been taught a small repertoire of social interaction in a preschool setting then develops a much larger set of social skills, the specific components of that repertoire reflecting the age and diversity of his peers. Or, generality can refer to the durability of change over time, such that a child whose bed-wetting has been eliminated will maintain dry beds thereafter.

Most technological development so far has been in the service of clinical problems; thus, most of the changes brought about are characterized as "desirable". Consequently, all three types of generality typically are sought. Desirable behavior should be manifest in all environments, should expand in detail and scope, and should endure.

Within that field of behavioral technology called "behavior modification", the typical mechanisms of behavior change have been drawn

from the principles of operant conditioning: contingencies of reinforcement, punishment, and extinction, combined with their derivative processes of scheduling, discrimination and fading, and differentiation (or shaping). These principles do not promise automatic generality, in any of three ways cited, for the behavioral changes they can produce. Indeed, the usual presumption is the opposite. The principle of discrimination states that behavioral changes brought about in one stimulus setting usually are specific to that setting. They may generalize to other similar stimulus settings, but unless comparable contingencies operate in those settings as well, this generalization will be transitory. Thus behavior in any environment eventually will reflect the contingencies which operate in that environment, not the contingencies which operate in other environments. Furthermore, behavior, unlike the flower, does not naturally bloom. The principle of differentiation states that effective contingencies will change those behaviors which they touch. These changes may generalize to other similar responses, but unless these responses meet comparable contingencies, this generalization also will be transitory. Thus behaviors eventually reflect the contingencies which they meet, not the contingencies which other behaviors meet. Finally, all the principles of operant conditioning imply the possibility of endless change in behavior over time. What has been reinforced at one time can be extinguished later, if reinforcement stops; what has been punished at one time can be recovered later, if punishment stops; and what has been extinguished at one time can be shaped later, if reinforcement resumes. Thus behavioral changes should endure over time only a little longer than the contingencies responsible for them endure.

Fortunately for a clinical technology, all of these rules are open to exception. Each of them is basically dependent upon experience over time: unsupported generalization across environments, unsupported generalization across responses, and unsupported generalization into the future all will

eventually disappear. If what is eventual can be delayed long enough, it becomes untrue for practical purposes, and practical is exactly what technology is supposed to be. Thus current technological research is increasingly aimed at arranging behavior modification procedures so as to make the eventual as late as possible.

Scheduling procedures, in their great diversity, offer a very promising avenue to this goal. It is already clear that certain interval and aversive schedules can extend their effects greatly into subsequent periods of extinction (Ferster and Skinner, 1957; Sidman, 1966). Chain schedules can extend reinforcing function almost indefinitely to stimuli previously without such function (Kelleher and Gollub, 1962). Recently, it appears possible to create a response class like imitation, in which certain imitations are never reinforced and yet endure over time (Baer, Peterson, and Sherman, 1967); this, too, can be viewed as a scheduling operation applied to functionally equivalent members of the response class (Gewirtz and Stingle, 1967). Thus, unsupported generality of behavioral change, over time, over stimuli, and over responses, is approached.

An alternative to unsupported generalization of course is the possibility of direct support for the new behavior, in other settings, in other forms, and into the future. This alternative has always been logically apparent, but it has often been considered impractical. If its implication is that the behavior modifier must follow his subject about throughout his various environments indefinitely into the future, programming contingencies as they go, then clearly enough this is not the stuff of which technologies are made. However, for some problems the behavior modifier may discover that there exists already an effective community of fellow behavior modifiers, their programs well practiced, effective, and running, waiting only for an

introduction to the subject. We mean to show that the preschool is such a community, and that by implication there must be many more useful communities of contingencies. We also mean to show that the problem of achieving generality of behavioral change can be as simple as the problem of introducing the subject to one of these communities.

Since 1963, the authors, in collaboration first with the preschool staff of the University of Washington and now with the preschool staff of the University of Kansas[1], have been engaged in the experimental modification of preschool child behavior. This program has attempted an experimental analysis of the variety of problem behaviors which preschool children can show, whether as a surplus of undesirable behavior or a deficit of desirable behavior. Typical studies in the program have used only social reinforcement from teachers as their experimental operations; thus the program also represents an attempt at experimental analysis of the actual and potential role of such reinforcement in a preschool setting.

In general, the program consists of two processes: (1) formal quantitative recording of the rate of the behavior under study and its current contingencies with teacher-supplied social stimulation, and (2) experimental manipulation of those contingencies.

First, a child is chosen for study who has some behavior problem of concern to his parents and the staff, such as excessive crying or aggression, or too little social play or physical skill. This behavior is recorded and measured in its natural contingencies. An observer is assigned to the child for the entire school session, day after day. The observer continuously time-samples the frequency and duration of the behavior and the frequency with which it meets social consequences from the teachers, such as their attention, interest, approval, disapproval, affection, support, encouragement, or consolation. This observation is pursued until a stable picture

of response strength and typical environmental contingencies is clear. Often enough, it will be found that an undesirable behavior frequently is responded to by teachers, or that a desirable behavior typically goes unnoticed (sometimes, perhaps, because teachers are busy with undesirable behavior elsewhere).

At this point, experimental manipulation of these social contingencies is introduced. The manipulations are designed to serve either of two standard experimental hypotheses: that if social stimuli from teachers function as positive reinforcers for preschool children, then (1) undesirable behavior is thereby being maintained by the attention it commands, or (2) desirable behavior is failing to develop for lack of a contingency with this attention. Therefore, the experiment consists of extinction for an undesirable behavior, or reinforcement for a desirable one. The teachers now thoroughly ignore all instances of undesirable behavior, or one of them is assigned the task of responding to all instances of desirable behavior. Most often, both operations are applied simultaneously, since typically an undesirable response has its desirable counterpart, and vice versa. Thus a child who is to be ignored for crying may be systematically attended to for self-help and independent behavior; a child who is being reinforced for social interaction with other children may often be ignored when by himself.

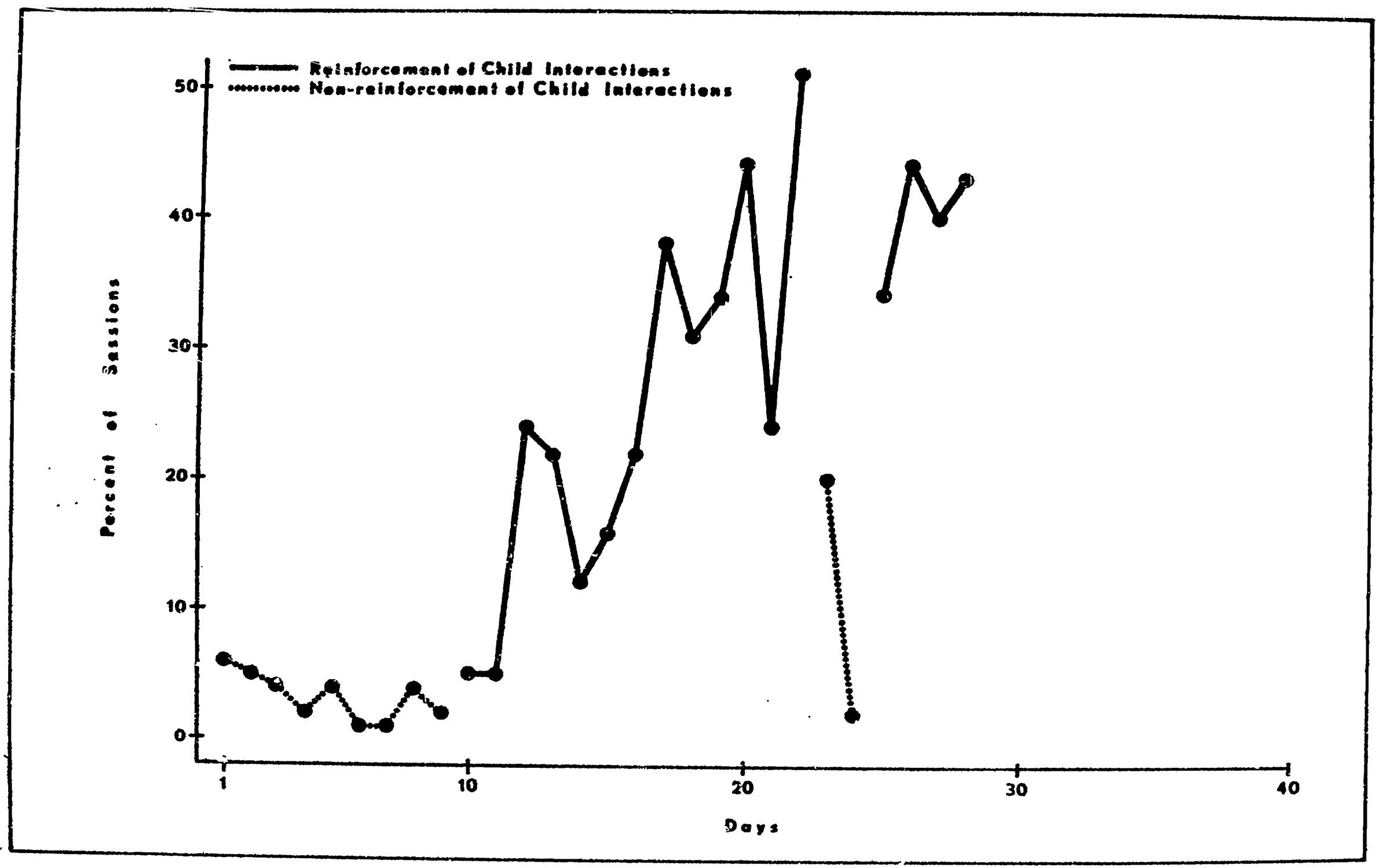
If the child's behavior appears to be changed by these experimental techniques, then they are discontinued briefly -- simply to see if they are indeed responsible for that change. They are discontinued in either of two ways: the teachers return to their former, "natural" practices, or else they deliberately turn their reinforcement and extinction to opposite behaviors. Thus, if they have been systematically ignoring crying and reinforcing self-help behaviors, they now may respond "naturally", meaning that they will probably attend to a fair amount of the crying but relatively little of the

self-help; or else they may completely transfer their reinforcement to crying while thoroughly ignoring self-help. (After extensive experience in the successful modification of child behavior through social reinforcement, teachers sometimes find it unnatural to respond "naturally". They know that whatever they do, they are thereby reinforcing something while extinguishing something else -- that is the essence of contingency. In effect, they now view themselves as a machine gun with a jammed trigger; they cannot stop firing; they can only learn how to take careful aim. Some find it easier to aim either at a behavior or away from it, rather than spraying the scene randomly.)

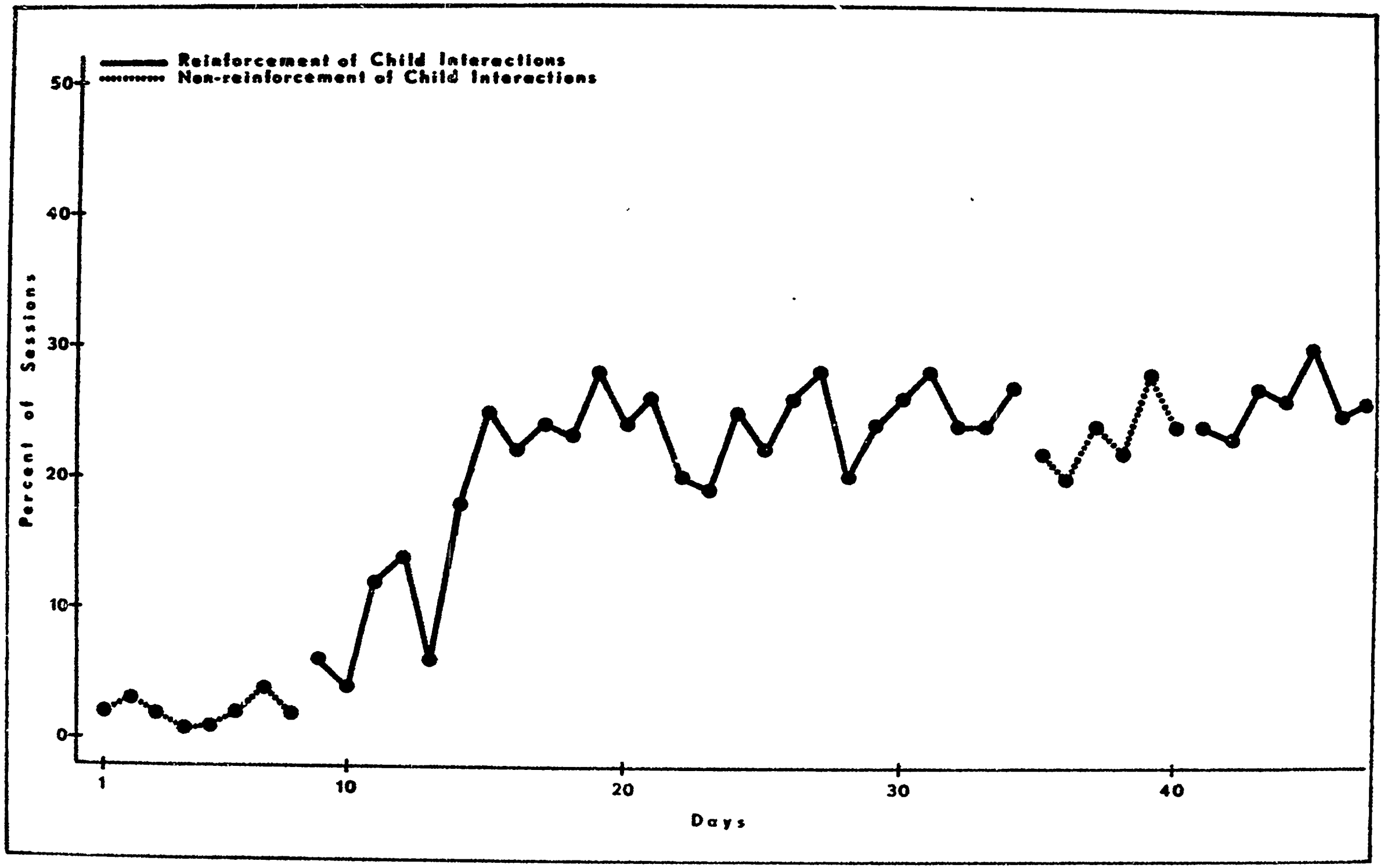
In general, discontinuation of the experimental contingencies usually reverses the behavior change just produced. That reversal is maintained just long enough to be clear. The experimental techniques are then reinstated and continued until the desired behavior change is at an optimal level. Reinforcement then is gradually reduced, approximating first variable ratio and then variable interval schedules of reinforcement, at a rate which does not disrupt the child's new desirable behaviors. Typically, such a rate can be found, and so the teacher and child presently are in a very informal relationship, one in which it would take extensive observation to note that a basic contingency is being scheduled. At this point, the teacher can be given another assignment for behavior modification; very little further planning is required for the previous case.

A typical case in point is the recent Master's thesis of Helen Foxwell (1966). Finding in her preschool group a three year old girl with a strong orientation toward adults but no skill in interacting with other children, Mrs. Foxwell, with her head teacher, Carolyn Thomson, and the authors made an experimental analysis of that child's relevant behaviors. In the process, Mrs.

Foxwell demonstrated that she was a preschool teacher who could analyze and improve the behavior of a preschool child by social procedures, experimentally verifying the process as she went through it, and so she earned her degree. Her observers noted that the child's typical rate of social interaction with other children was only about 3% of each preschool session, virtually none of it noticed by adults; meanwhile her rate of interacting exclusively with adults, mainly Mrs. Foxwell, approximated 20%. Mrs. Foxwell reinforced child interactions with her own attention, consequently, and extinguished purely adult-oriented behaviors to a considerable degree. In the course of thirteen days, child interactions had come to a new average of 40%, and adult-oriented behavior had decreased to about 5%. That is approximately the pattern of other preschool children who are judged to be socially skilled. So, after thirteen days of experimental reinforcement, Mrs. Foxwell discontinued her procedure, by reversing it. She now responded to all the child's attempts to interact with her, and paid no attention to the girl's play with other children. On the first day of reversal, child interactions fell to 20%, and on the second day, to 2%; meanwhile, adult-oriented behaviors jumped to a 35% average. That seemed to demonstrate the role of social reinforcement, and it was again transferred to child interactions after only two days of reversal. Child interactions were recovered almost immediately and averaged over 40% of each session for the next four days. Thereupon Mrs. Foxwell began her gradual retreat toward intermittent reinforcement, descending through a series of variable ratios and intervals which did not systematically diminish the child's rate of interaction with other children. Figure 1 illustrates the course of child interaction through the successive phases of this study.


Reinforcement of Child Interactions
Non-reinforcement of Child Interactions
50
40
30
20
10
0
Percent of Sessions
1
10
20
30
40
Days

Mrs. Foxwell's study is quite typical of a number in which preschool teachers have developed better social repertoires in their children (Baer and Wolf, 1967). In all these studies, reversals of the experimental patterns of reinforcement have been programmed fairly early, promptly after the satisfactory development of the desired social repertoire in the child. In each such case, reversal of procedure has led to a reversal of the developing new behavior; but when the experimental patterns of reinforcement were reinstated, the new behavior was quickly recovered, maintained, and even further developed. That has been true until quite recently when Carolyn Thomson and the authors attempted a similar experimental analysis of social skill. The child in question was another three year old girl, with a very low rate of child interaction and a rather infantile way of being helpless. The low rate of child interaction proved amenable to reliable observation, and teacher reinforcement was programmed for it. The child's rate was promptly raised from its usual previous level of about 2% to a new rate averaging about 25% of each session. However, in this case, while the new rate of child interaction quickly became satisfactory, its topography was slow in showing changes. Nevertheless, it seemed that the baby-like quality of the girl's behavior was beginning to be replaced by a more mature style. Consequently, the customary reversal of procedure was delayed for about seven weeks of reinforcement, rather than interrupt this slowly developing but much desired aspect of her behavior. Then, reversal was programmed. However, the child's rate of interaction with other children did not change to any obvious degree, even though her teacher was now attempting to reinforce her quite vigorously for adult-oriented behavior. When teacher reinforcement was again transferred to child interactions, the rate of child interactions remained at the same slightly variable 25% which had characterized it for the past five weeks. In experimental terms, that behavior was out of the control of teacher reinforcement. This subsequent failure of experimental control is seen in Figure 2. The teacher


Reinforcement of Child Interactions
Non-reinforcement of Child Interactions
Percent of Sessions
50
40
30
20
10
0
1
10
20
30
40
Days

in fact, had for some time felt that she was wasting her reinforcement on a child thoroughly under the control of her peers. The child's peers were reinforcing her, not experimentally but nonetheless effectively, for interacting with them; she, in turn, was reinforcing them -- now -- effectively enough to maintain a role in their play groups. The experimenters had applied procedures to her to accomplish exactly that, of course; and she had initially responded to these procedures as did other children to whom such procedures have been applied. Thus, it may be presumed that the teachers introduced the girl to that community of mutual reinforcement contingencies, but left her in it too long to be able to extract her again (and thereby demonstrate beyond the possibility of coincidence that their procedures were indeed responsible for the change). But a presumption is not as good as a demonstration; consequently, it was decided to examine this process of trapping a child within the peer group as it occurred.

The word "trapping" is used deliberately. Quite a number of its connotations apply. Consider, for example, that very familiar model, the mouse trap. A mouse trap is an environment designed to accomplish massive behavior modification in a mouse. Note that this modification has thorough generality: the change in behavior accomplished by the trap will be uniform across all environments, it will extend to all of the mouse's behaviors, and it will last indefinitely into the future. Furthermore, a mouse trap allows a great amount of behavioral change to be accomplished by a relatively slight amount of behavioral control. A householder without a trap can, of course, still kill a mouse: he can wait patiently outside the mouse's hole, grab the mouse faster than the mouse can avoid him, and then apply various forms of force to the unfortunate animal to accomplish the behavioral change desired. But this performance requires a great deal of competence: vast patience, super coordination, extreme manual dexterity, and a well suppressed

squeamishness. By contrast, a householder with a trap needs very few accomplishments: if he can merely apply the cheese and then leave the loaded trap where the mouse is likely to smell that cheese, in effect he has guaranteed general change in the mouse's future behavior.

The essence of a trap, in behavioral terms, is that only a relatively simple response is necessary to enter the trap, yet once entered, the trap cannot be resisted in creating general behavioral change. For the mouse, the entry response is merely to smell the cheese. Everything proceeds from there almost automatically. The householder need have no more control over the mouse's behavior than to get him to smell the cheese, yet he accomplishes thorough changes in behavior.

A preschool is a behavioral trap of a very similar sort. It is not quite so fast, not quite so irresistible. The entry response takes a little more behavioral control, but is still relatively simple compared to the generality of behavioral change which will follow it. Note the kinds of changes which a peer group of three year olds can accomplish in a member. They will add to his vocabulary and to his inflection patterns, especially to his shouting skills; they will teach him to share, somewhat; they will teach him to wait his turn, sometimes; they will teach him to do what they want, but they may also teach him ways to get them to do what he wants; and they will develop his motor coordination, his endurance, and his daring. A preschool teacher could consider programming reinforcement for all those behaviors, of course, but it is obviously a massive assignment. She will do better to trap him into those developments. The entry response will take only a few days to a few weeks of shaping, if it is well chosen. In one study, a child was trapped into her peer group by extinguishing the crawling behavior which kept her from the typically upright and fast-moving games of her peers. Putting her on her feet took only four days of reinforcement, and that was sufficient

to constitue an entry response into her peer group (Harris et al., 1964). In another study, a girl was reinforced merely for being within three feet of another child. Within six days she was consistently maintaining proximity to other children, and in the course of doing that she became trapped (Allen et al., 1964). In two other cases, boys were trapped into their peer groups by being reinforced for vigorous climbing activity, the lack of which (apparently through laziness and fearfulness) had left them out (Johnston et al., 1966; Cooper et al., cited in Baer and Wolf, 1967). In current studies, the entry response to social interaction with other children is whatever convenient sample of social behavior the child under study happens to show, or can be prompted to show. By reinforcing these relatively few and unsophisticated social responses, the child becomes trapped, whereupon very general social development results shortly afterward. An example of this prompting of social behavior, and of the effects of reinforcing it until it enters the social trap of the peer group, is seen in the recent Master's thesis of Mrs. Ellen Ingram (1967).

Mrs. Ingram demonstrated that she could develop a desirable social repertoire in a four year old boy, and examined the process and its components experimentally. She worked in collaboration with her head teacher, Margaret Cooper, and the authors.

Her subject showed a very low rate of skillful social interaction with either children or adults. He would, however, follow teachers about, staring at them intently. Eight days of observation showed that fully 30% of his average preschool session was devoted to staring intently at teachers or other children at play, but doing little else. Other categories of social interaction, such as following the lead of others in some activity, saying the same things that others said, sharing materials and toys, conversing or laughing with others, or cooperating in the building of a structure, the conduct

of a game, or a role-playing activity such as playing store, averaged a mere 3% of his day at preschool. Yet other preschoolers, skilled and happy in social interactions in this setting, would average only about 10% of a session simply staring at others, and would spend typically 30% of their time in one or another of the categories of social interaction just described.

It was decided to examine the effects simply of asking other children to play with the boy, an operation called "priming". That meant that teachers would suggest to other children that they approach him, perhaps with a toy, perhaps with an idea for joint play. Ten days of priming others produced a small and stable effect: his interactions with children rose from their usual 3% average to a new level of about 7% of each session. Consequently, the teachers tried a different technique of priming: they suggested directly to the boy that he approach some other child, with a toy, some materials, or a play idea. Typically, the child did as suggested. But, just as typically, the play thus created would be brief. Total interaction with other children remained at its stable level of 7% during eight days of this condition. During these eighteen days of priming, the teachers had averaged 25 such primes each day.

It seemed clear that priming alone would not produce the development desired. Priming had more than doubled the child's rate of interacting with other children, from 3% to 7%. Nevertheless, this doubling apparently was supported almost entirely by the teachers' efforts. To see if indeed the 7% rate of child interaction depended on the teachers, the priming technique was discontinued for five days. In the course of these five days, the boy's rate of child interaction dropped to an average of 4%, similar to the 3% level he had displayed prior to the eighteen days of priming. Thus, it seemed clear that priming effects alone were neither large enough nor value, nor durable.

Consequently, a combination of double-priming and minimal social reinforcement was designed and applied. The teachers primed other children to approach the boy with some suggestion for play; as this occurred, the teacher would appear and prompt the boy to reply; if necessary, the teacher would put words in his mouth or materials in his hands, and push him gently into the interaction that had just been invited. The shaping of behavior in this setting became very nearly literal. The reinforcement was minimal, in that the teacher, having put one suitable response into the boy for the occasion, then would leave, to see if with at least a start, the child could maintain the interaction himself.

To some extent, he could. Over a period of nine days of double-priming and minimal reinforcement, the boy achieved an average level of child interaction approximating 17% of each session. His previous level with simple priming had been 7%; thus, the new technique had more than doubled the level of child interaction. However, the teachers were spending no more time with the boy than previously, and so the difference represented a result of at least some of his own efforts in maintaining the interactions which the teachers had started and lightly reinforced. The quality of this interaction had developed as well: conversation, sharing, following the leads of others, and cooperation all showed considerable gains.

Then for four days, the teachers discontinued their priming and minimal reinforcement technique, to see if the child would maintain his new level of interacting with children. To some extent, he did; to a greater extent, he did not. Over the four days, he showed an average of 10% of each session spent interacting with other children, entirely on his own initiative, or theirs, but without teacher support. His initial levels of child interaction, it will be recalled, were about 3 or 4%; this level was 10%, and showed no signs of

deteriorating further. The teachers noted that he was indeed using some new behaviors in dealing with the other children, and was at least responding to their bids much more promptly than he had previously in the study. This represented progress, but not enough for satisfaction.

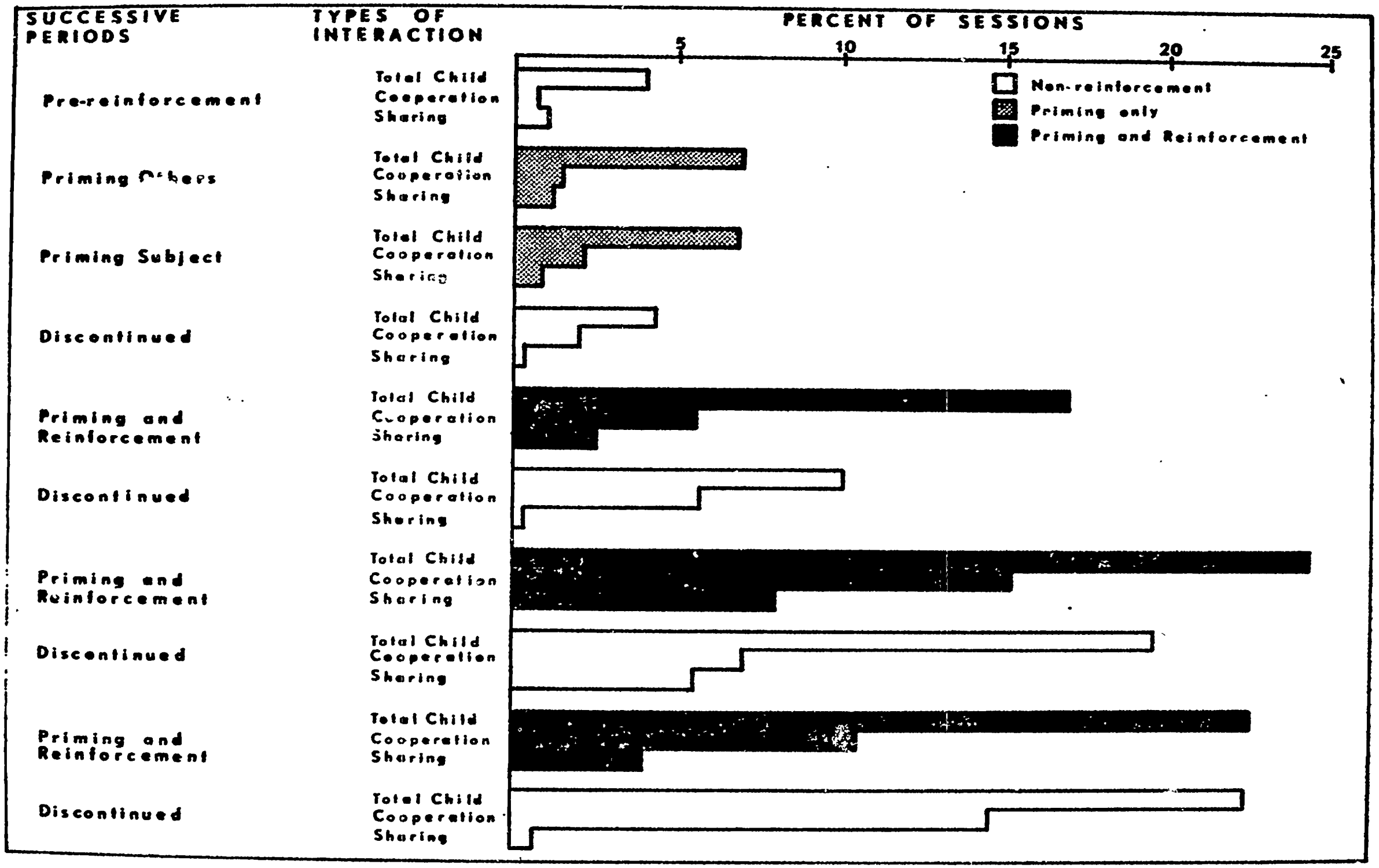
Therefore, double-priming was resumed, this time with intensive social reinforcement for any interaction that resulted. The teachers' techniques, in sequence, were these: another child was primed to approach the boy; as he did so, the boy was primed to respond; if he did, the teachers displayed delight over the interaction; they then gently faded away from the interaction, but returned soon, if it were still going on, to express more delight and appreciation. They continued "dropping in" as long as the interaction went on, but more and more minimally, and less and less frequently. Five days of this priming and intensive reinforcement produced child interactions averaging 24% of each session. The quality of this interaction was measurably superior to that seen previously, in that cooperation in structured activities rose to new highs, averaging 15% of the typical session.

Again, teacher reinforcement was discontinued, to see if these new attainments would survive without direct teacher support. The overall rate of child interaction suffered relatively little, yielding an average over three days of 19%; however, the cooperative component of that interaction was cut in half, dropping to a 7% average. Therefore, priming and reinforcement were resumed. Over a twelve-day period, child interactions again averaged their now usual 23%, and cooperative interactions recovered their previous level of 15%. And so, for the fourth time in this study, teacher priming and reinforcement were discontinued. For seven days without any systematic teacher intervention, the child displayed virtually the same levels he had during his last period of reinforcement: 22% of his average session spent in some form of interaction with other children, and 14% of those sessions spent

in relatively sophisticated, cooperative interactions. Thus, the study was finished as such; the peer group had taken over the teachers' project, and the child's rate of interaction with that group was no longer readily available for the teachers to change. Furthermore; the gradual development of that independence had been observed. The process is shown sequentially in Figure 3.

A preschool is intrinsically a community of reinforcement contingencies which will shape and maintain an ever increasing repertoire of social behavior and will put that behavior under the control of peers. Thereby, the preschool creates generality of behavioral development, in that a child's peers will go with him into new environments and into the future. Thus, a preschool is a behavioral trap, the entry response to which is relatively simple, the behavioral consequences of which are relatively massive and general.

If this analysis of the preschool has any generality itself, then there must be many more communities of reinforcement ready to make general behavioral changes in any one who develops an entry response. The language community is an obvious example; the graduate school is another; the bar yet another. One approach to the solution of achieving generality of behavioral change is to have an appreciation of what behavioral traps exist for the changes desired, and what the entry responses for those traps can be.


SUCCESSIVE PERIODS
TYPES OF INTERACTION
PERCENT OF SESSIONS
5
10
15
20
25
Non-reinforcement
Priming only
Priming and Reinforcement
Pre-reinforcement
Priming Others
Priming Subject
Discontinued
Priming and Reinforcement
Discontinued
Priming and Reinforcement
Discontinued
Priming and Reinforcement
Discontinued
Total Child Cooperation Sharing

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FOOTNOTES

[1]The authors acknowledge their great debt to the total staffs of these preschools, and in particular to their directors, Florence Harris and Barbara Etzel, and their head teachers, Eileen Allen, Margaret Johnston, Betty Hart, Nancy Reynolds, Joan Buell, Carolyn Thomson, and Margaret Cooper.