

THE UNIVERSITY OF MANITOBA

THE COMPARATIVE EFFECTS OF A BACKSCRATCH CONTINGENCY OF
REINFORCEMENT AND BACKSCRATCH VERBAL FEEDBACK ON SOCIAL
INTERACTION WITHIN TWO DYADS OF SEVERELY RETARDED CHILDREN

by

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ABSTRACT

A backscratch contingency is one under which the reinforcement received by one subject of a dyad is contingent upon the response of the other subject and vice versa. That is, S_A responds and S_B receives the reinforcer and vice versa. Backscratch verbal feedback in this study was feedback indicating to one subject in a dyad that the behavior of the other subject was responsible for the opportunity just made available to gain reinforcement. In general, backscratch verbal feedback refers to the pairing of a partner's name with reinforcement.

In the present study, two dyads of severely retarded children were taught to key press for candy rewards. Then subjects were twice exposed to backscratch verbal feedback and backscratch verbal feedback paired with a backscratch contingency for key pressing. Social interactions of looking were always observed to increase more in phases of backscratch verbal feedback paired with a backscratch contingency than in immediately preceding phases of backscratch verbal feedback alone. Verbalizations were observed to be equal or higher in occurrence during some conditions of backscratch verbal feedback paired with a backscratch contingency than in conditions of backscratch verbal feedback alone. Undesirable interactions of hitting and yelling never occurred.

No generalization to another environment was observed and this issue along with other parameters determining backscratch-produced interactions is discussed.

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CHAPTER I

INTRODUCTION

The widespread success of the operant approach to learning in the field of retardation has been largely due to its efficacy as a method of teaching a variety of skills to those who were once considered "untrainable". In a relatively short time it has changed the prognosis for the future of the retardate in society. It has indeed been a crucial factor in changing the functional definition of institutions caring for the retarded from one of a custodial nature to that of a forward moving training environment, from which the retardate graduates to the community at large, thus occupying some meaningful position in the social structure.

Although much success has been realized for the mild and moderate retardate in this quest, a more fundamental problem remains with the numerous severe and profound retarded residents now occupying a large percentage of the space in institutions. To date, the general training and research effort with severe and profound retardates has been focused on self-care skills such as toilet training, eating, dressing, etc., and elementary skills such as colour discrimination, picture and object naming, imitation training, and numerous other elementary classroom behaviors. In many cases children diagnosed originally as severely and profoundly retarded have acquired repertoires placing them at a performance level of the moderate retardate and there seems to be no indication that some of them will not progress to even higher levels. Because of the statistically large percentages of severely and profoundly retarded residents in institutions and a prognosis that the occurrence of severe and profound retardation in society will not change much in the near future it would seem logical that research should now focus on how to get the severely and profoundly retarded to at least a

moderate performance level. Such research would then enable a complete change of the function of the institution away from the custodial end of the scale.

An important step in acquiring a finer discriminatory repertoire is the acquisition of social skills. The ability to engage in effective interactions with one's environment provides an individual with opportunities to learn how to use one's present repertoire to gain reinforcement from the environment and change that repertoire when it becomes less efficient. Any individual unable to interact in this manner will suffer great deficits in his or her ability to maintain even a limited self-care repertoire. Thus, these people will always require outside help to cope in the society. There does not appear to be, however, any reason why severe and profound retardates cannot acquire such skills and advance to higher levels of learning both within the institutions and in the society at large.

Many people working in the field have realized this need for development of social skills in the retarded and much research has been conducted in developing social interaction using retarded subjects. Often the procedures used have been successful but have required the use of trained personnel, much time, and specialized equipment and procedures. Much of the research conducted to date involves the study of co-operation as a definition of social interaction and this may be contributing to a confusion in the literature on what we mean by social interaction in a general sense. However, some methods of studying co-operation have produced social interactions of verbalizing, pointing, etc. between subjects.

It is the purpose of this thesis to distinguish between various methods of developing social interaction and further, to present an alternative method for developing social behaviors in severe and profound retardates as a side effect of a "backscratch" co-operation contingency.

This method appears to be effective in producing desirable interactions between peers without any need for extra experimental sessions or highly trained personnel using elaborate equipment. The present study is a refinement and partial replication of earlier work in the field and is discussed in this context.

CHAPTER II

REVIEW OF THE LITERATURE

A. Some Theoretical Notions of Social Behavior

The relationship between the individual and the group has provided the major framework of social psychology, (Brown, 1965; Proshansky and Seidenberg, 1966). In all endeavours into specific areas of knowledge, the procedures by which man has attempted to gain understanding of specific environmental phenomena by finding and predicting order via casual relationships have been numerous. In retrospect they appear distributed on a continuum of usefulness. Thus, the social scientist has discarded some methods of describing his condition in space and time in favour of methods which describe more data, and furnish more understanding, relative to those discarded. This never ending process is of course occurring in social psychology in numerous subfields of interest and is providing new and beneficial ways of analyzing the subject matter of the field.

With the behavioral movement and its emphasis on operationalism in enquiry into psychological phenomena have developed analytic methods for reviewing social behaviors. Thus, social psychology has seen a focus on a more functional analysis of its subject matter. Exemplary of this approach recently are works by McGuinnies (1970) and McGuinnies and Ferster (1971) which provide a basis of fundamentals and readings of varied behavior analyses of social behaviors. Much of the work is based on B.F. Skinner's (1938, 1953, 1957, 1969) work on operant conditioning, that is, the relationship of organisms to their environment via the effect of response consequence.

Skinner (1953) defined social behavior as "the behavior of two or more people with respect to one another or in concert with respect to a common environment". In general, Skinner holds that attention, affection,

etc., function as conditioned reinforcers due to previous pairings and other reinforcing events in the environment. However, because interactions of others are themselves behaviors which vary greatly due to their own environmental consequences, their net reinforcing value is constantly in flux and intermittent in nature. It is not unusual therefore that man experiences a continuum of reinforcing value for social behavior that is not as stable as fixed environmental reinforcers that vary in relatively fewer dimensions.

McGuinnies (1970) proposed: "social behavior is evidenced whenever two or more organisms, either directly or indirectly serve both to prompt and reinforce one another's performance."

Generally, the view supported by a behavioral position on social behaviors is that the laws of conditioning pertain to individuals in groups just as they pertain to individuals when alone. The only difference is that there exist more variables in the social situation which affect our behavior in those situations than when alone. Many psychologists feel that there is "more" going on in a social situation than mere observational data can explain. Lindsley (1966), offered a typical response to supporters of that view:

"In the experimental analysis of social behavior it is necessary to compare directly social and non-social situations preferably on the same individuals. Only in this way can the social and non-social properties of the behavior be parcelled out and the contribution of individual performance variables (such as motivation and discriminative ability) be separated from the emergent social variables."

B. Direct and Indirect Reinforcement of Social Behavior

As reported by Whitman, Mecurio and Caponigri (1970), many individuals working with retarded subjects have noticed that a major difference between severe and moderate retardates is the lack of social interaction found in the former category of residents in institutions. Klaber, Butterfield and

Gould (1969) have demonstrated that some institutions do not propagate interaction in their residents and that these residents do find social interactions reinforcing. Regardless of whether social interaction is among peers or towards staff it would seem that an increase in outgoing behavior in the retarded would provide many more opportunities to acquire behavior for the retarded. It follows that if a severely retarded individual is to advance to a performance level approaching the moderate range, then that individual must become more "social" and engage in more varieties of social behaviors in order to realize the repertoire of the finer discriminating moderate retarded. In realizing the important role that social behaviors play in the development of the severely and profoundly retarded researchers have examined a variety of approaches which may be classified into two major categories: 1) the development of social interaction through direct reinforcement of social behaviors; and 2) development of social interaction as a side effect of reinforcing some other behavior via other contingencies.

Included in the first category, Whitman et. al. (1970) reported an increase in social behavior with two severely retarded children after they were reinforced for mutual participation in a ball rolling and block passing task. There was a corresponding increase in a non-training situation and a generalization effect to other children not involved in the study.

Paloutzian, Hasazi, Streifel and Edgar (1971) used prompting and reinforcement to develop an imitative repertoire in ten severely retarded children for social behaviors. These experimental subjects showed a significantly higher mean occurrence of social responding after training than did ten control subjects who were not trained. The major contribution of this study is a demonstration that currently used imitative training could be enlarged to contain complex social responses.

Kale, Kaye, Whelan and Hopkins (1968) used cigarettes to increase greeting responses in chronic withdrawn mental patients. The greeting responses increased and generalized to several experimenters after increasing the schedule of reinforcement and were maintained seemingly by natural reinforcers three months after the experiment terminated. Weison, Hartly, Richardson and Roske (1967) used candy and social rewards to increase the amount of social interaction in six young retarded children. The definition of social interaction in this study was concerned with a "generosity" response along with a looking and proximity criteria. An interesting feature of this study was that interaction fluctuated consistently with contingent reinforcement for interaction behaviors.

In a similar vein Hington and Trost (1964) used candy rewards to increase vocal and physical interactions in four non-verbal early childhood schizophrenics previously observed to initiate little or no social interaction. The use of shaping is well demonstrated in this pioneer article. Initially, only physical contact was reinforced. Then in latter steps socialization was required to gain reinforcement. Vocalization was achieved with all but one of the children.

Social interaction has also been studied as a side effect of reinforcement contingencies for other behaviors (category 2). Buell, Stoddard, Harris and Baer (1968) in their classic article reported an increase in the social interactions of a three-year old preschool child with motor and social deficits. By first prompting the child to use the outside play equipment and reinforcing the occurrences of that behavior, they successfully established a small repertoire of equipment use by intermittently rewarding longer and longer periods of time on the equipment alone. Collateral social behaviors of vocalizing, touching and co-operating with other children on the equipment

increased.

Kirby and Toler (1970) used an interesting tactic to increase the social behaviors of a five-year old preschool boy with his classmates in a nursery school. By having the child give out reinforcers to other children (for which he was rewarded with money and candy), social behaviors of proximity, co-operative play, verbalization, and manipulatory motor behavior were increased substantially. Variables such as peer reinforcement and the pairing of the child with primary reinforcement are not ruled out as plausible contributing factors in the authors discussion of the results. Nevertheless, the method was shown to be a "practical alternate" to teacher-attention methods.

In applying a token economy to a class of retarded children, Zimmerman, Zimmerman and Russell (1969) noticed an interesting social side effect to their results. Using tokens to reinforce appropriate instruction following behavior they noticed that some subjects' behaviors appeared to be socially directed toward another subject. Various instances were reported of subjects helping fellow classmates emit the appropriate behaviors. These behaviors, although not quantified, did not appear to occur in control sessions during which no tokens were used.

These representative studies show the consistency with which social behavior can be modified via contingent reinforcement. In most cases it seems that a well established social repertoire will maintain itself via natural consequences and generalize to other situations. A salient feature of this approach, however, is the need for rigorous control in arranging the environment for social-response acquisition. Many sessions appear to be required by qualified personnel to initiate a social repertoire via a reinforcement scheme which must be slowly weened to a more natural intermittent rate.

C. Co-operation and Social Behavior

Another frequently studied mode of social interaction could be included under both of the above classes of increasing social responses. This is the area of co-operation analysis. Co-operation is a well documented area and is frequently used in the various approaches of research to the area of social behavior.

In a classic study, Daniel (1942) taught eight rats individually to avoid shock in a Skinner box by sitting on a movable shelf for 30 seconds which delayed shock. During this time the animal was also taught to feed at a food cup in the centre of the chamber immediately upon being put into the chamber without the shock contingency. Thus at the end of preliminary training each animal had learned to discriminate whether to go to the shelf to avoid shock or go to the feeder when placed in the chamber.

The rats were divided into pairs and put into the chamber with the grid electrified and the food cup in the centre of the chamber. After forty days of sessions the rats acquired a mode of co-operative responding. One would feed while the other remained on the shelf (to remove shock) and then they would switch positions. Daniel reported that one animal would reach off the shelf and "bite" or "nudge" the feeding animal or crawl on its back causing it to return to the shelf. The net result was a preliminary simple form of co-operation. In a second study (Daniel, 1943) sitting on a platform raised a cover over the food cup which as in the previous study was inaccessible from the platform. No shock consequence was used in this study and co-operation was not observed.

Skinner (1962), presented two similar displays of co-operation using pigeons. In one display pigeons were reinforced individually for pecking a ping pong ball to make it fall on the opposite side of a table. The

reinforcement was made more intermittent and then two birds were placed opposite each other. The resulting behavior was a competition between the birds to get the ball past each other. In another demonstration of co-operation he trained pigeons to peck different sets of keys simultaneously to gain mutual food rewards. Skinner analyzed the co-operative response acquisition as one of a leader-follower variety. That is, one bird responded to the environmental cues and the other to the first bird. This analysis was supported in that the birds would imitate responses not specifically under experimental control, such as dunking.

Since these first speculative works in the area a finer analysis of co-operation has been completed.

Azrin and Lindsley (1956) demonstrated that social behavior can be controlled by its consequences in a co-operation design. Ten teams of two children were taught to put a stick into one of three holes in a table top. When sticks were placed in opposite holes at the same time both subjects received reinforcers (candy). All ten partnerships learned the co-operative response within ten minutes. The co-operative repertoires were shown to extinguish upon removal of the contingency and increase again upon its re-establishment.

Sidowski, Wycoff, and Taboury (1956) conducted a study on the effects of reinforcement and punishment in a minimal social situation using 20 dyads of university students. The experiment is a classic in that it demonstrates the use of a functional analysis of a social situation as supported by conditioning theory. In this study two subjects unaware of each others' presence had a choice between two buttons to push at any one time. One button of each subject shocked the other subject, the remaining button scored points for him. The 20 dyads were divided into two groups of strong shock

and weak shock. The results showed that strong shock dyads learned to earn each other points and avoid shock whereas weak shock dyads did not. Learning occurred in the first five minutes of the 25 minute sessions. The analysis offered supports the idea that "social" behavior is based on the same behavior principles as those pertaining to individual behavior. Sidowski et. al. state that research should investigate a more functional analysis of behavior rather than variables of awareness, understanding or attitudes.

Cohen (1962) in an experiment with a normal 13 year old male, Justin, demonstrated co-operation abilities of Justin with five significant other people in his environment. Using the automated plunger device used by Azrin and Lindsley (1956) and pennies and candies, Cohen reinforced subjects for plunger pulling within .5 seconds of each other. Justin responded by initiating co-operation with some subjects and followed the response patterns of other subjects consistent with a description of his everyday interactions with these people. That is, he co-operated with a friend exchanging leadership but assumed leadership with a younger sister when the leadership role (who responded first) was open for competition. Justin's leadership behavior was controlled in some phases of the study and uncontrolled in others. When working with a partner whom he normally assumed a leadership role with (outside of the lab) under conditions in which only the partner could lead co-operative responses, Justin's response rate extinguished. Cohen's methodology coupled with Azrin and Lindsley's (1956) apparatus created the opportunity for Lindsley's later work in 1966.

Lindsley (1966) showed further use of the free operant method of analyzing co-operative and competitive behaviors. By using enclosed cubicles and a plunger response for money reward he varied the contingencies for the team responses of normal children. Defining the responses of two subjects A and B as co-operative if less than .5 seconds elapsed between them,

he studied responding of dyads as a team by denoting possible response combinations (A followed by B, AB, etc.) electrically. Subjects were subjected to numerous conditions of response order for reinforcement under social (in view of each other) and non-social (feedback on partner's status via lights) situations. As conditions could be changed within the same session for the same subjects an analysis of the social connotation to so-called social behavior was possible.

The findings indicated that co-operation acquisition was not nearly as quick in non-social situations as it was when each subject knew he or she was co-operating with another person. Leadership in co-operative responding was differentially reinforced with subsequent acquisition of leadership behaviors in the desired subject. In teams who were initially on a co-operative reinforcement schedule, subjects alternated leadership under competitive conditions to alternate who got the reinforcer. In one dyad he reported that a situation was arranged where A could provide B with an opportunity for reinforcement but could not himself be reinforced. A provided 110 reinforcers for B who emitted only smiles in return.

This landmark in co-operation research provided a methodology for further examination of social connotation as described by Lindsley. The fact that differential control of leadership was affected differently due to the presence of human stimuli versus mechanical stimuli in an otherwise identical situation has immediate ramifications for research in which more than one individual is present.

Exemplary of the studies it sparked, were the findings reported by Vogler (1968) that awareness was a variable effecting acquisition of co-operative responses. When the contingencies of reinforcement were not explained to child subjects, only those who vocalized to each other acquired

co-operative behavior on a work task.

Schmitt and Marwell (1968) conducted a further study of co-operation using the Lindsley (1966) apparatus and procedure. Schmitt and Marwell held that much of the co-operative responding in the Lindsley study (1966) could have been accidental and not due to the subjects co-operating. Subjects could respond at a high rate and co-operate by chance, especially after time outs. Schmitt and Marwell reduced the probability of chance co-operation by delaying the co-operation response time to 3 seconds but not longer than 3.5 seconds. The results indicated that subjects in conditions equivalent to Lindsley's (1966), "mechanical" condition under a co-operative response definition of .5 seconds latency between leader and follower plunger pulls, were relatively unaffected by presence or absence of response lights and time-out lights in making co-operative responses. However, when the definition of a co-operative response was made 3.0-3.5 seconds, the absence of cue lights drastically affected co-operative responding. Additionally, because the order of responses indicated leadership in the Lindsley study, his findings might be viewed with less confidence due to a further analysis by Schmitt and Marwell. Using the established fact that at least .2 seconds are required to respond to a stimulus and that if subjects are responding to the partner's behavior and not the stimulus lights (as Lindsley would suggest) few of a subject's pulls should be within .2 sec. of the partner's. If, on the other hand, subjects are responding to all lights there will be a higher number of a partner's responses within .2 seconds of the other partner's response. However, Schmitt and Marwell's subjects scored response intervals of less than .2 seconds 80% of the time on the original task and less than 4% under the modified delay task.

Thus, if subjects are responding to time-out lights, etc. and not each other, then the subject that pulls first is determined by chance. This

greatly reduces the validity of Lindsley's (1966) conclusions on leadership and its control as the results could have been determined simply due to which subject had the quicker motor reflexes.

The disruption of co-operation in dyads when subjects were given an opportunity to take some of the partner's money was demonstrated in a series of three studies conducted with the same methodology (Schmitt and Marwell, 1971). Disruption was greatest when taking could occur whenever subjects could co-operate. Co-operation was disrupted also when intervals of taking were permitted occasionally during co-operative periods. Results in general showed subjects would rather take the immediate reward rather than co-operate for higher values of money.

Mithaugh and Burgess (1967) present evidence that for complex group responses individual reinforcement is needed along with a group response, and the more complicated the task the more individual reinforcement is necessary. In another report (Mithaugh and Burgess, 1968) they replicated this phenomenon in a series of five studies examining different reinforcement contingencies and co-operation. These two reports are interesting in that they deal with groups of three subjects and not dyads and use complex co-operative responses.

Hake and Vukelich (1972) in a timely review of co-operation procedures defined as to the essential aspects of co-operation: (1) that the reinforcers of both individuals are at least in part dependent upon the responses of the other individual, and (2) that the procedure allows such responses, designated as co-operative responses, to result in an equitable division of responses and reinforcers. Then, using the notion of a "co-operative episode" they classified the co-operative literature into dimensions dependent upon the type of co-operative contingency employed, given that all co-operation

procedures contain performance behaviors and choice behaviors and only performance behaviors are to be dealt with by the present review. (The reader is referred to Nemeth (1970) for a review of co-operation literature concerned more with choice behaviors; e.g., prisoners dilemma game). The procedural dimensions employed by Hake and Vukelich are: (1) dependency upon behavior of partner for reinforcement (dependent or interdependent); (2) deviations from reciprocity (response sharing or response exchange); (3) partner as a social stimulus (non-social or social); and (4) alternative non-co-operative response (forced or alternative response). In this paper Hake and Vukelich posit the various definitions of how researchers should proceed in examining co-operation parameters. These methods are outlined under the general heading of "Demonstration of control by the co-operation procedure", which they subdivide into "control resulting from the reinforcer obtained from the co-operation procedure and control by the specified procedural relation between responses and reinforcers". Their analysis and comments on the exemplary studies make clear the issues involved in this area of research.

On examination of the literature presented by Hake and Vukelich, it becomes obvious that most research has focused on co-operation studies in which both subjects respond in order for both to be reinforced, i.e., "response sharing, interdependent reinforcement", (see Hake and Vukelich, 1972 for details). A less researched area by comparison is that of "response exchange" (Hake and Vukelich, 1972). This procedure does not require an equitable distribution of reinforcers or responses. That is, there can be great deviations from reciprocity under such a contingency. However, it is common to normal human interaction and is best characterized by: "I will do the work this time you do it the next" (Hake and Vukelich, 1972, page 337). This type of dependent,

response exchange co-operation is of great interest for several reasons. To begin with, it has numerous examples in normal human interaction. One person completely depends on another for reinforcement on one occasion and returns it on another occasion. Reciprocity is not always maintained but this mode of basic interaction pointed out by Daniel (1942, 1943) and analyzed by Keller and Schoenfield (1950) is well demonstrated by many everyday social situations.

Boren (1966) trained monkeys to respond on a fixed ratio 15 schedule for reinforcement. That is, each monkey was trained to press a bar fifteen times to gain a food reinforcer. Two monkeys were thus trained and placed in cubicles adjacent to each other and put on a schedule of reinforcement such that when Monkey A responded Monkey B received the food reinforcement and vice-versa. Even rates of responding and equal reinforcer distribution were maintained only when stimulus lights were employed to control the responding of each monkey. When the stimulus lights were removed the co-operative behavior deteriorated, that is, one monkey would respond until he had extinguished and the other monkey would consume the reinforcers until he satiated.

Powers and Powers (1971) attempted a replication of the Boren design which proved quite interesting. Two dyads of severely retarded subjects were able to maintain an equitable distribution of responses and reinforcers after a second application of this co-operative contingency when in a first application co-operation had disintegrated as it did with the Boren monkeys. It was on this second application that a very important observation was made which should be of interest to co-operation researchers. During the course of the Powers' experiment an increase in social interaction (not co-operation) within dyads was unsystematically observed and it was mentioned

in passing by Powers who suggested that further research in the area might focus on social interaction as a major dependent variable with this co-operative contingency he called the "Backscratch Contingency" as the Independent Variable.

Williams, Martin, McDonald, Hardy and Lambert (1973) employed the same co-operative procedure with severely retarded girls to test the effect of the "backscratch contingency" on social interaction per se. Williams et. al. found that social interactions of looking, vocalizing and pointing increased with a generalization effect to another setting during the backscratch contingency for a table setting response, and decreased during an individual reinforcement contingency for the same behavior. Thus, this response-exchange type of co-operation contingency seemed to facilitate communicative social interaction.

CHAPTER III

STATEMENT OF THE PROBLEM

The social interaction observed in the Williams et. al. (1973) study may have been due to an uncontrolled variable in the design. Whenever subject A of two subjects was reinforced with a token from the experimenter due to subject B's appropriate responding (i.e., the application of the backscratch contingency), the experimenter also said something like "Good girl A. B responded appropriately". Thus the resulting social interaction may have been due to this "Backscratch Verbal Feedback" and not the result of the backscratch co-operation contingency per se. The major purpose of this study was to quantify the relative effects of the backscratch contingency of reinforcement and backscratch verbal feedback as variables contributing to the increase of social behaviors in retarded children.

Additionally the present study was designed to (1) replicate the "backscratch phenomenon" for increasing social behaviors; (2) replicate the findings of Powers and Powers (1971) in observing a co-operation effect of equal distribution of work task responses for a learned work task response under a backscratch contingency.

CHAPTER IV

METHOD

Subjects

Three subjects (Ss) classified as severely retarded and one S classified as profoundly retarded by the Stanford Binet Intelligence Scale administered at the Manitoba School for Retardates in Portage La Prairie, Manitoba, were studied. The two Ss (Ralph and Calvin) forming dyad I were retarded males from Spruce Cottage, a self-contained cottage of the school. Ralph and Calvin were 15 and 13 years old respectively and had I.Q. scores of 23 and 16 respectively. The two Ss (Elizabeth and Dianne) forming dyad II were from Cedar Cottage, another self-contained cottage of the school. The girls were 13 and 15 years old respectively with I.Q.'s of 30 and 21 as measured by the school tests. None of the Ss had any previous experience on a co-operative (Backscratch) schedule of reinforcement. The girls had participated in the various operant training programs of the cottages for the past five years, and the boys for the past two years. (For samples of these programs, see Martin, England, and England, 1971; Martin, Kehoe, Bird, Jensen and Darbyshire, 1971; Treffry, Martin, Samels and Watson, 1970).

Elizabeth and Dianne replaced two additional female Ss who after one week had failed to acquire a necessary key press response as outlined under Shaping the Work Task of the procedure section.

Apparatus

The experimental chamber for the Ss consisted of two adjacent cubicles, each two feet by four feet and separated by a plywood divider. Built into this divider was a sliding door which moved in a front to rear plane and which could be opened from either side of the divider revealing a clear perforated plexiglass panel allowing vision into the adjacent cubicle. The slider, if opened, automatically returned to a closed position when released.

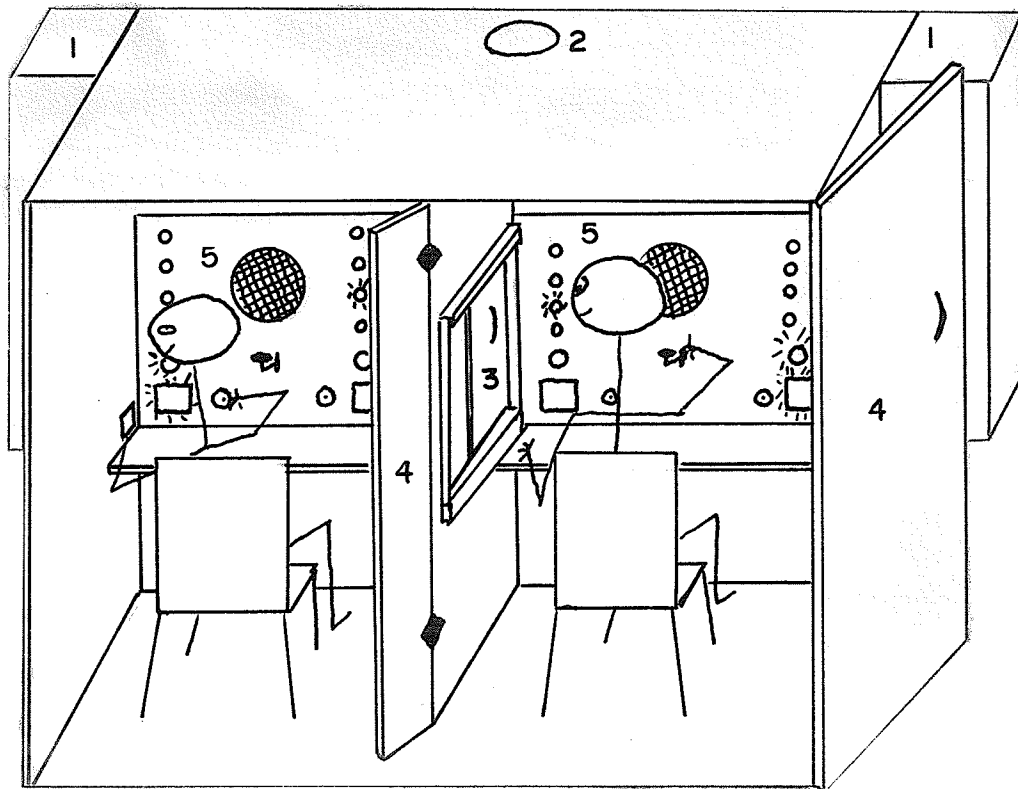
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Each cubicle had a chair and a two-foot by two-foot panel which sat on a small ledge desk 30 inches from the floor in front of the S. From the top of the panel to the roof of the cubicle there was an open space covered by clear plexiglass allowing the S to see outside of the cubicle (to counteract possible claustrophobic reactions). Each panel contained a grill-covered speaker in the top centre with a telegraph key below it in the exact centre of the panel. Down the left side of a panel were four evenly spaced one-half inch wide red lights, and below them was a larger one-inch red light, below which was a three-inch by three-inch plexiglass covered opening with a button beside it. The right side of each panel was identical except that the lights were green. Behind each of the large plexiglass covered openings was a small black box in the rear of which was placed a three inch by three inch polaroid snapshot of each S such that each S saw a picture of his or herself on the left under the red lights and his or her partner under the green lights if small bulbs which were located inside the black boxes were illuminated.

In the outside wall at desk level on each side of the cubicle was a small four-inch square hole through which candy reinforcers (chocolate raisins, M & M's, peanuts, and popcorn) were dispensed from universal feeders. The tape recorders, lights, and dispensers were automatically controlled by standard relay equipment. The experimental room and observation room were equipped with a two-way intercom.

A portable Sony tape recorder, two sets of Jana head phones and a twenty-five foot extension cord for the head phones were used for generalization observations made on the general ward. A pre-recorded tape with ten-second observation and ten-second record intervals numbered from one through

A)



B)

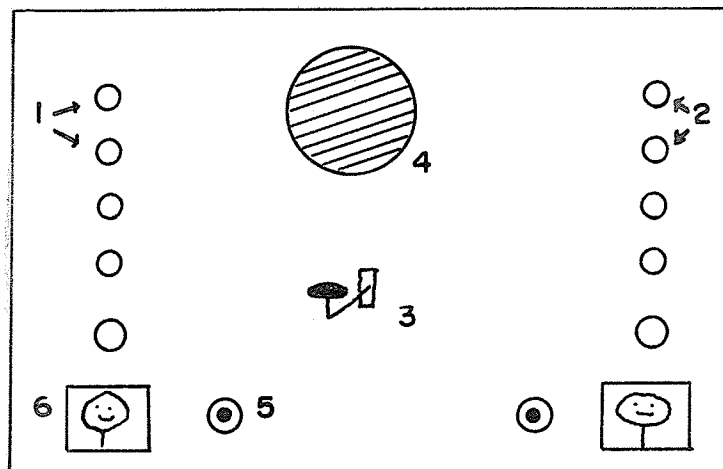


Fig.1. The session chamber and response panels.

Figure 1: A) The experimental cubicles.

B) A sample response panel.

- 1 - Candy dispensers
- 2 - House lights
- 3 - Sliding door
- 4 - Entrance doors
- 5 - Response panel

- 1 - Red lights
- 2 - Green lights
- 3 - Key
- 4 - Speaker
- 5 - Reinforcer button
- 6 - S's picture

ninety such that each observation interval was followed by a record interval was employed. Data sheets for generalization measures were divided into ninety squares corresponding to the tape and these were used for recording data observed during the observation intervals only.

General Session Procedure

Each dyad experienced two twenty-minute sessions per day which were conducted in the morning and afternoon at the same time every day. The Ss were placed in the cubicles in the appropriate sides (which were alternated to counterbalance "handedness" of Ss, and time of day).

Social interactions during all sessions were recorded as follows. The experimenter (E) would record which S opened the slider. The slider-door opening automatically started two clocks, one measuring cumulative slider opening time, the other clock signalling ten second intervals that the slider was open. A prepared set of operationally defined behaviors was recorded as occurring or not occurring per ten-second interval when the slider was open. Thus, the maximum number of occurrences of a behavior would be 120 for a twenty-minute session (continuous slider openings). The following list of behaviors were recorded.

<u>Behavior</u>	<u>Definition</u>
looking	Looking at the partner for one-half second or longer (as judged by the E); partner does not have to be looking back.
verbalization	Any audible verbalization judged by the E to be directed to the partner.
pointing	Any hand gesture by the subject judged by the E to be a communicative attempt at bringing the partner's attention to something in the environment.
touching	Touching of the partner by the S through the perforations in the plexiglass divider panel or in the general ward situation. (Judged by E as non-accidental i.e., "brushing" as Ss pass each other is accidental).

yelling	Verbalizations above the normal level for that S following the same criterion as verbalizations.
hitting	Striking the partner with intent to harm or above normal touching pressure for that S (not measured in sessions, but only in the general ward situations on generalization tests).

Generalization to the Ward Setting

Throughout the experiment a daily thirty-minute observation of social interaction of each dyad in either the day hall or the cottage dining room was made. The time of these sessions was alternated daily from morning to afternoon. Recording the same behaviors as defined and coded for sessions, two Es standing approximately 20 to 30 feet apart monitored ward interactions wearing head phones and using the prerecorded tape on which were recorded ninety observation and record intervals. Only occurrence or non-occurrence of a response was indicated during the ten-second record intervals for behaviors emitted in the previous ten-second observation intervals. Two sets of observations gave the reliability measure for the data.

Reliability

During sessions one E (designated at the start of the study) acted as the main observer and the accompanying E was the reliability observer. After a session, reliability was calculated by dividing agreements by agreements plus disagreements for each behavior and multiplying this figure by 100. Agreement on blank intervals did not enter into the reliability estimates. There were 18 such checks taken during the female dyad responding and 21 during the male dyad responding. Omitting scores of 57, 75, and 79 the average reliability score was 93%.

During generalization sessions reliability measures were calculated daily. The occurrence of interactions on the general ward was of such a

low frequency, however, that the meaningfulness of the checks was questionable. That is, because agreement on blank intervals was not included in the calculations, reliability measures varied greatly since they often amounted to agreement or disagreement as to whether one occurrence or two occurrences of a behavior were observed out of 120 possible occurrences. The model interobserver agreement score was 100%, but dropped to as low as 50% on some days. There were fifty such checks taken before the generalization measure was abandoned due to the lack of the generalization effect.

Shaping the Work Task

Two Ss of a dyad were placed in their cubicle and shown how to make their red lights come on. The panels in the cubicles were initially hooked up in such a way that a key press by S_A on the telegraph key would light up the top red light to the left of S_A on S_A 's panel, and the top green light to the right of S_B 's panel. One more such response would light up the next red light of S_A and the next green light of S_B and simultaneously turn out the first lights on each respective panel. The remaining two lights in each bank of four lights could be illuminated similarly. A fifth key press would illuminate the large red light of S_A and the large green light of S_B 's panel and simultaneously illuminate the picture of S_A in S_A 's cubicle under the large red light and the picture of S_A under the large green light on S_B 's panel. More concisely, each S was on a continuous reinforcement schedule for key pressing to gain lights, and five such responses gained his picture presented to him, and also to his partner. Simultaneously an S received feedback about a partner's responding via the green lights down the right side of that S's panel. Once an S's picture and the large red light were illuminated, an S would receive the verbal feedback, "Good girl" (or "Good Boy") through his or her speaker from the pre-recorded tape. Key presses

made while the tape was playing (about $3\frac{1}{2}$ seconds) were recorded but not consequated (these are included as part of the data presented). A response on the button adjacent to his or her illuminated picture under the red lights automatically dispensed a small candy reinforcer through the chute opening and turned off that S's large red light and the partner's large green light. A key press made while the picture was illuminated turned off the lights but did not dispense the candy. The same set of contingencies were simultaneously applied to the panel of S_B such that each S could earn red lights and, eventually, his or her picture and then button press appropriately to gain a candy reinforcer. Simultaneously each S could also monitor the responding of his or her partner via the green lights on their respective panels. Recorded instructions to each S were audible through the divider but were much louder in each respective cubicle.

During the first two sessions, two Ss were given verbal prompts via the intercom to press the telegraph key. The other two Ss responded without additional verbal prompts. Also during the first session, the function of the sliding door was shown to all the Ss and they observed each other in their cubicles. The sliding door was opened by the E several times from each cubicle for each S. After three sessions of earning candies with the panel light advancement on a continuous schedule of reinforcement, the Ss were switched to a fixed ratio two schedule for panel light advancement in which two responses advanced the light. Ss were free to respond on the keys and buttons and open the slider as they wished from the very first session.

SPECIFIC PROCEDURES AND RESULTS

Baseline

Procedure

Each S in each dyad was allowed to key-press to earn his or her own red lights and eventually his or her own picture. When the picture was earned

each S heard via his own speaker either "Good Boy" or "Good Girl", (whichever was appropriate). A button press under the stimulus condition of the S's picture and the large red light "on", gained a small candy reward. Button presses under the illuminated picture of the partner and the large green light, due to the partner's responding, were not consequated. The baseline continued for 28 sessions (14 days) for dyad I and 20 sessions (10 days) for dyad II. Dyad II had fewer sessions because they were selected after a previous dyad did not acquire key pressing (as described in Subjects section).

The baseline condition and the other conditions of the study were usually continued until a stability criterion was reached or until a maximum of 20 sessions occurred. The stability criterion utilized was one described by Sidman (1960, page 267) that compared several measures of average responding to each other in terms of the range of responding. Specifically, responding was considered stable when each difference between any two of three specific measures (namely, the mean of the first two of the last four sessions of a condition, the mean of the last two sessions of a condition, and the mean for the last four sessions of a condition) was within 10% of the range of responding for that particular phase. A constraining factor on meeting stability was that both dyads had to have their experimental conditions changed at the same time for equipment management reasons. Any deviations from these criteria are noted in the following phases. Both key pressing and social interaction met the stability criteria in the baseline conditions for all Ss.

Results

The key pressing of the two dyads are presented in Figures 2 and 3.

Insert Figures 2 and 3 about here

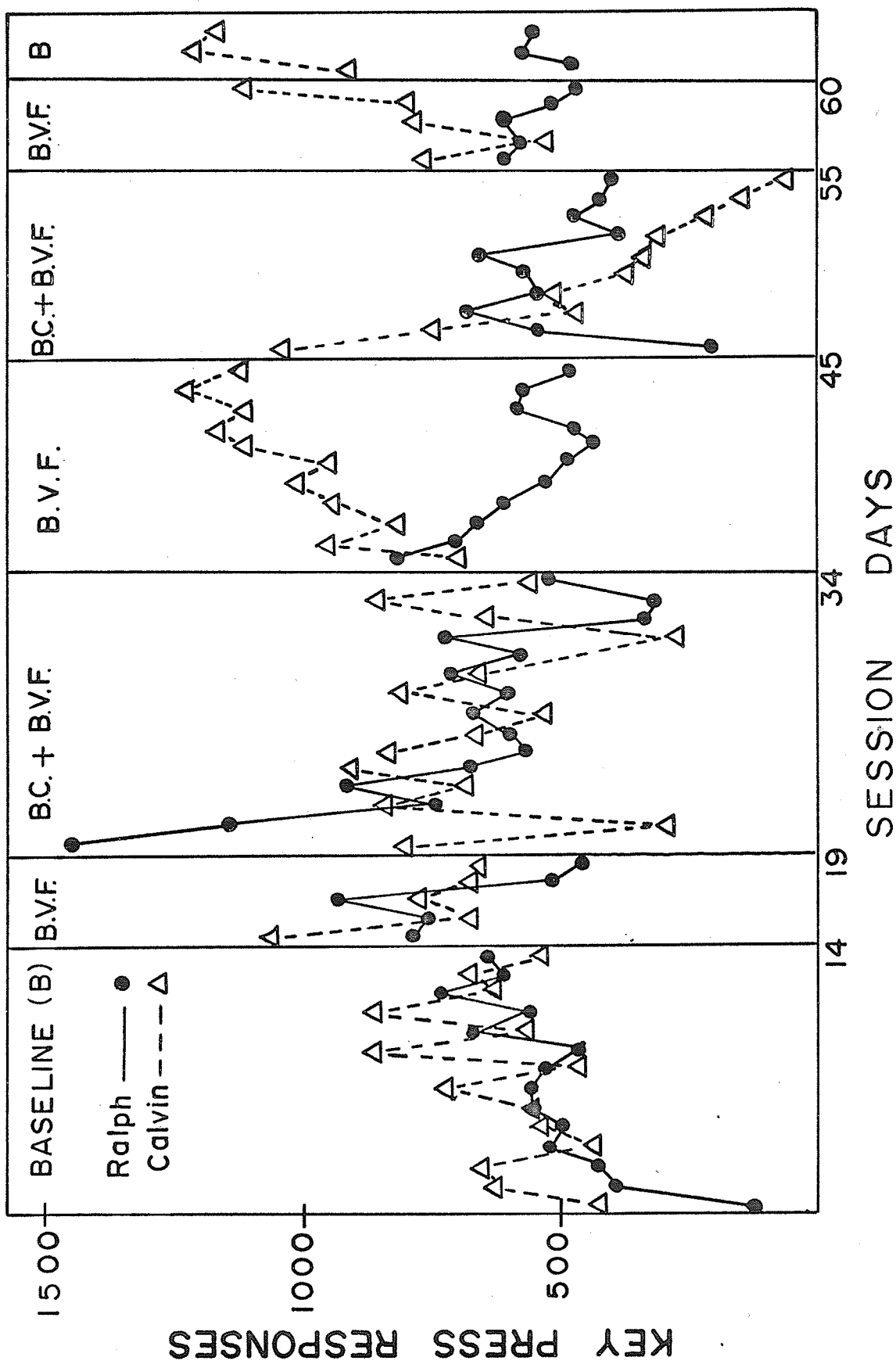


Fig. 2. Frequency distribution of the male dyads' average key pressing per session day. Each data point represents the average number of responses per session for two daily twenty minute sessions.

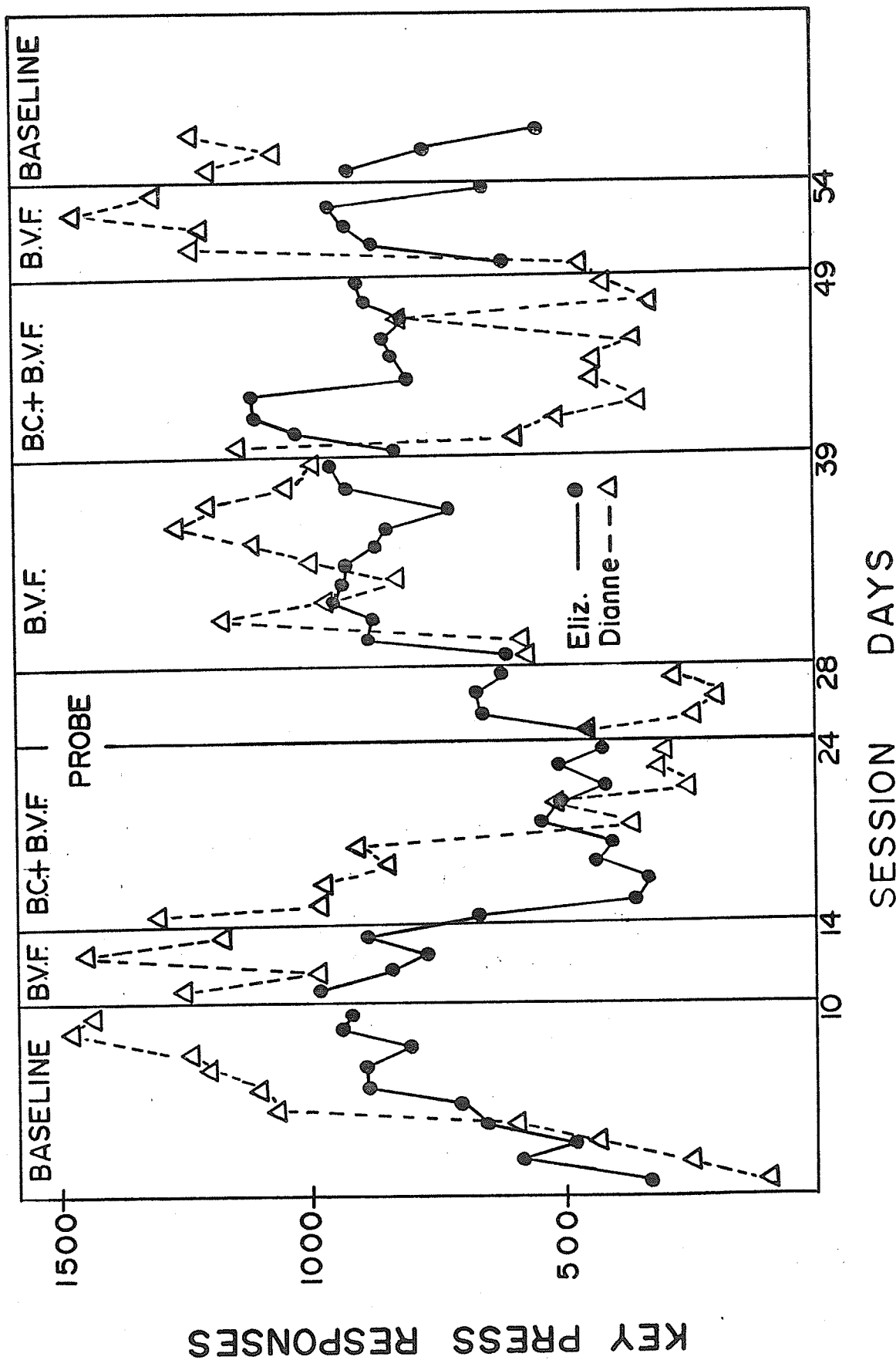


Fig. 3. Frequency distribution of the female dyads' average key pressing per session day. Each data point represents the average number of responses per session for two daily twenty minute sessions.

Key pressing rates increased for all Ss in both dyads during the initial sessions. Slider openings for the boys stabilized by day fourteen (see Figure 4), along with the work task (key pressing), and the baseline phase was terminated. The girls key pressing had stabilized by day ten (see Figure 3), and were also changed to the next condition. Their slider openings occurred

- - - - -
Insert Figure 4 about here
- - - - -

on only two sessions during baseline, and therefore are not graphed separately. Interactions of touching and pointing occurred at such a low frequency throughout the study that they are not presented graphically. Interactions of yelling and hitting never occurred. There was no observed generalization of interaction to the general ward during the baseline condition.

Backscratch Verbal Feedback (B.V.F.)

Procedure

This condition differed from the baseline in that instead of hearing "Good Boy" or "Good Girl", contingent upon their key pressing illuminating the large red light, the S heard "Good Boy" or "Good Girl" in addition to a reference to his or her partner having pressed his or her (the partner's) key. That is, using the female dyad as an example, Elizebeth would hear "Good Girl, Elizabeth. Dianne pressed her key" on each occasion that Elizabeth's responding led to her picture being illuminated. However, each S was still earning her own red lights via her own key. In effect, the Ss were still on individual contingencies for key pressing, but the partner's name was paired with each opportunity for candy reinforcement. This phase lasted for ten sessions at which time stability was met on both dependent variables (key pressing and social interaction) for the boys, and on social interaction for the girls.

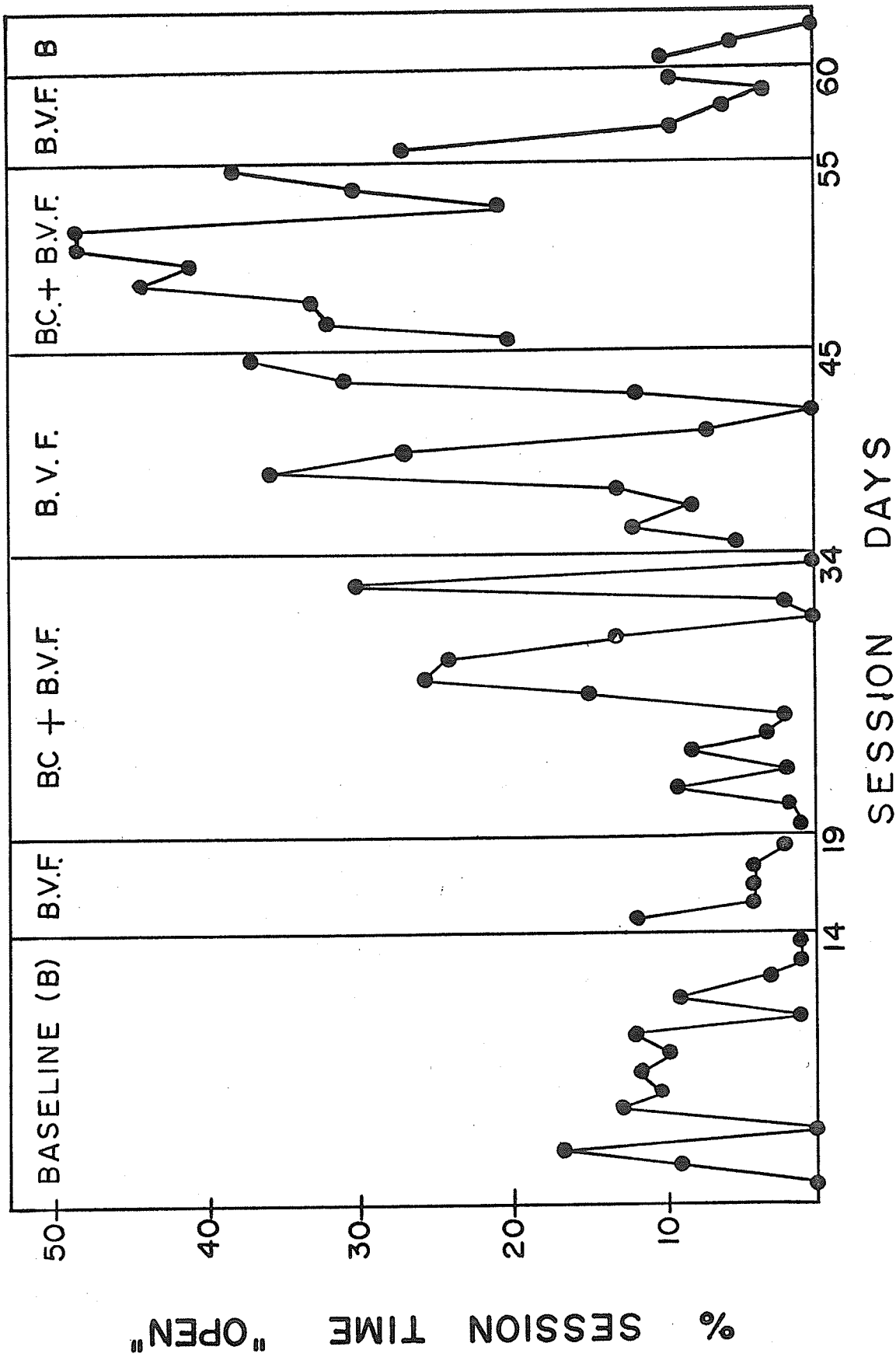


Fig. 4. The average percentage of session time per day that the slider was open for the male dyad. Each data point represents the average amount of time per session for two daily twenty minute sessions.

Results

All S's key pressing remained relatively consistent across this condition (see Figures 2 and 3). The social interaction during sessions for the boys as measured in terms of slider openings was also relatively constant and unaffected by B.V.F. (see Figure 4). This can be further seen in Figures 5 and 6 which show the type of social interaction that was recorded by E's while the slider was open. Since the girls opened the slider on only two occasions during B.V.F., slider openings were again not plotted.

Insert Figures 5 and 6 about here

The type of interaction during slider openings can be seen in figures 7 and 8.

Insert Figures 7 and 8 about here

In terms of generalization on the ward, Dianne looked at Elizabeth and verbalized to her on one occasion of all of the generalization observation sessions. Elizabeth, however, did not reciprocate the interaction. The boys did not interact at all on the general ward during generalization observations.

Backscratch Contingency Plus Backscratch Verbal Feedback (B.C. and B.V.F.)

Procedure

In this condition the Ss received the same verbal instruction as in the B.V.F. condition but on a different contingency. The contingency was the backscratch condition and under this condition S_A 's key responding produced red light advancement for S_B and green light advancement for S_A ; and vice versa for S_B 's responding. Each S, however, still had to button press appropriately to get a candy reinforcer when his or her red light and picture

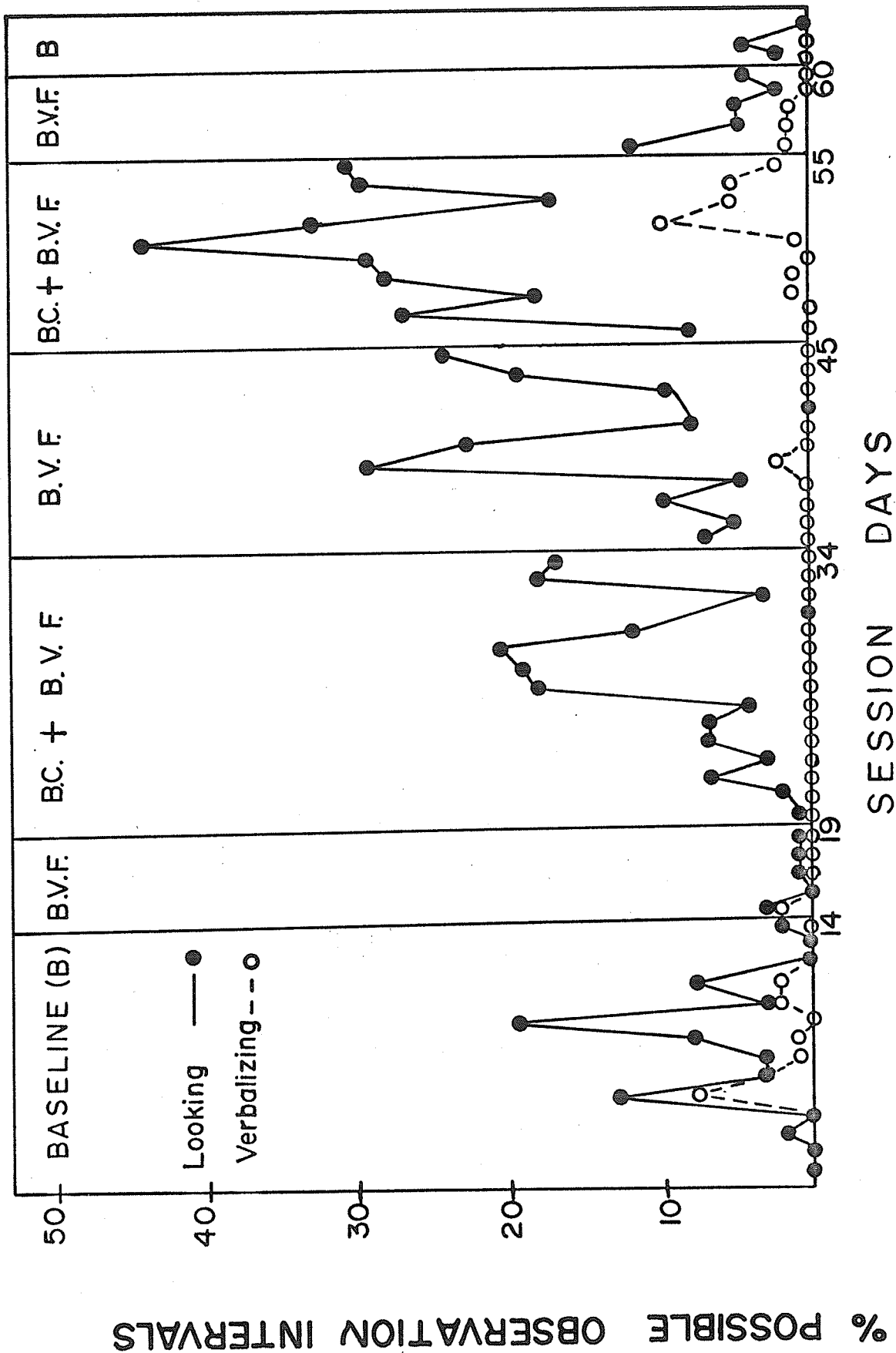


Fig. 5. Frequency distribution of Ralph's average "social" interaction per session day. Each data point represents the average percentage of observation intervals in which interactions occurred for two daily twenty minute sessions.

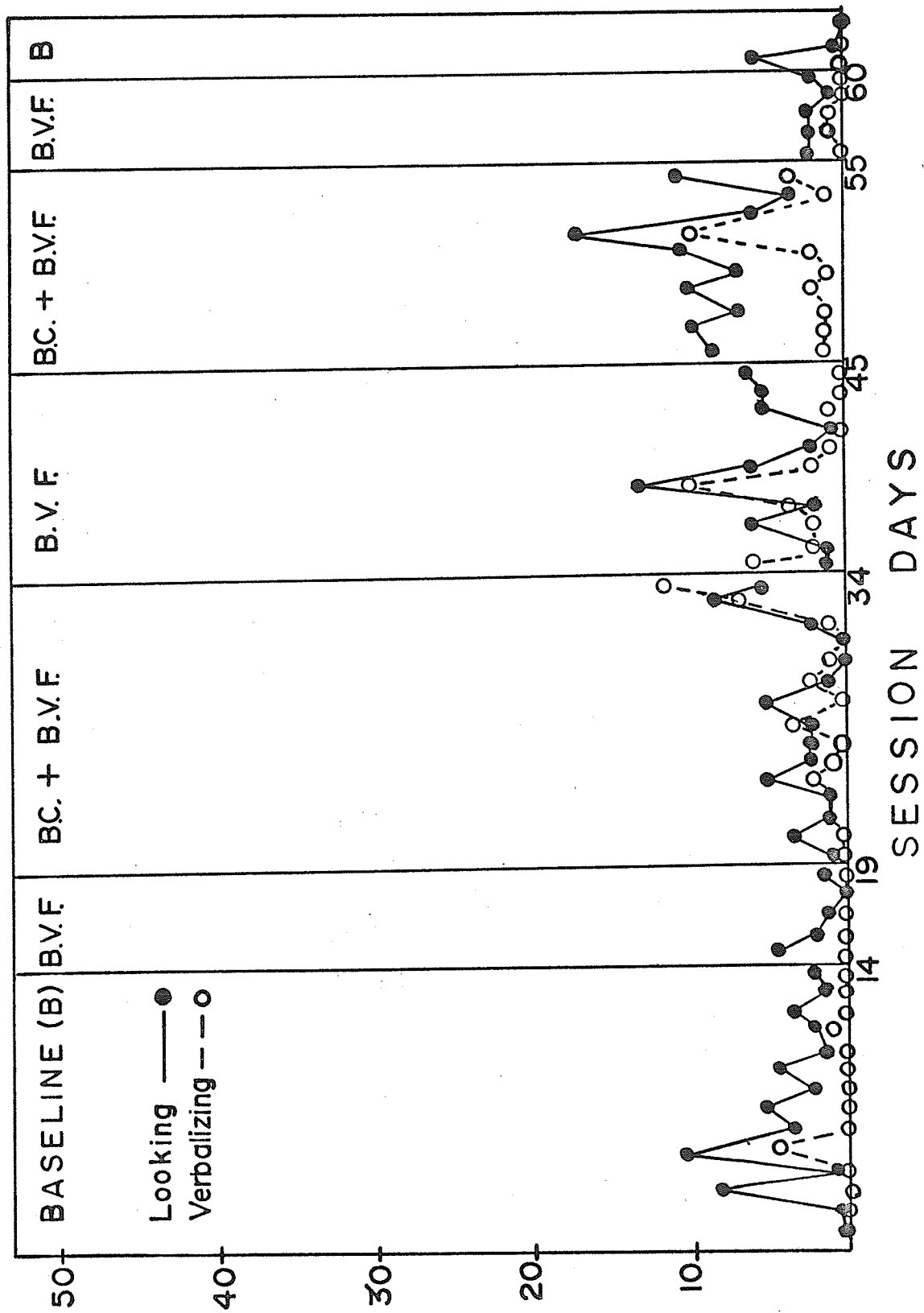


Fig. 6. Frequency distribution of Calvin's average "social" interaction per session day. Each data point represents the average percentage of observation intervals in which interactions occurred for two daily twenty minute sessions.

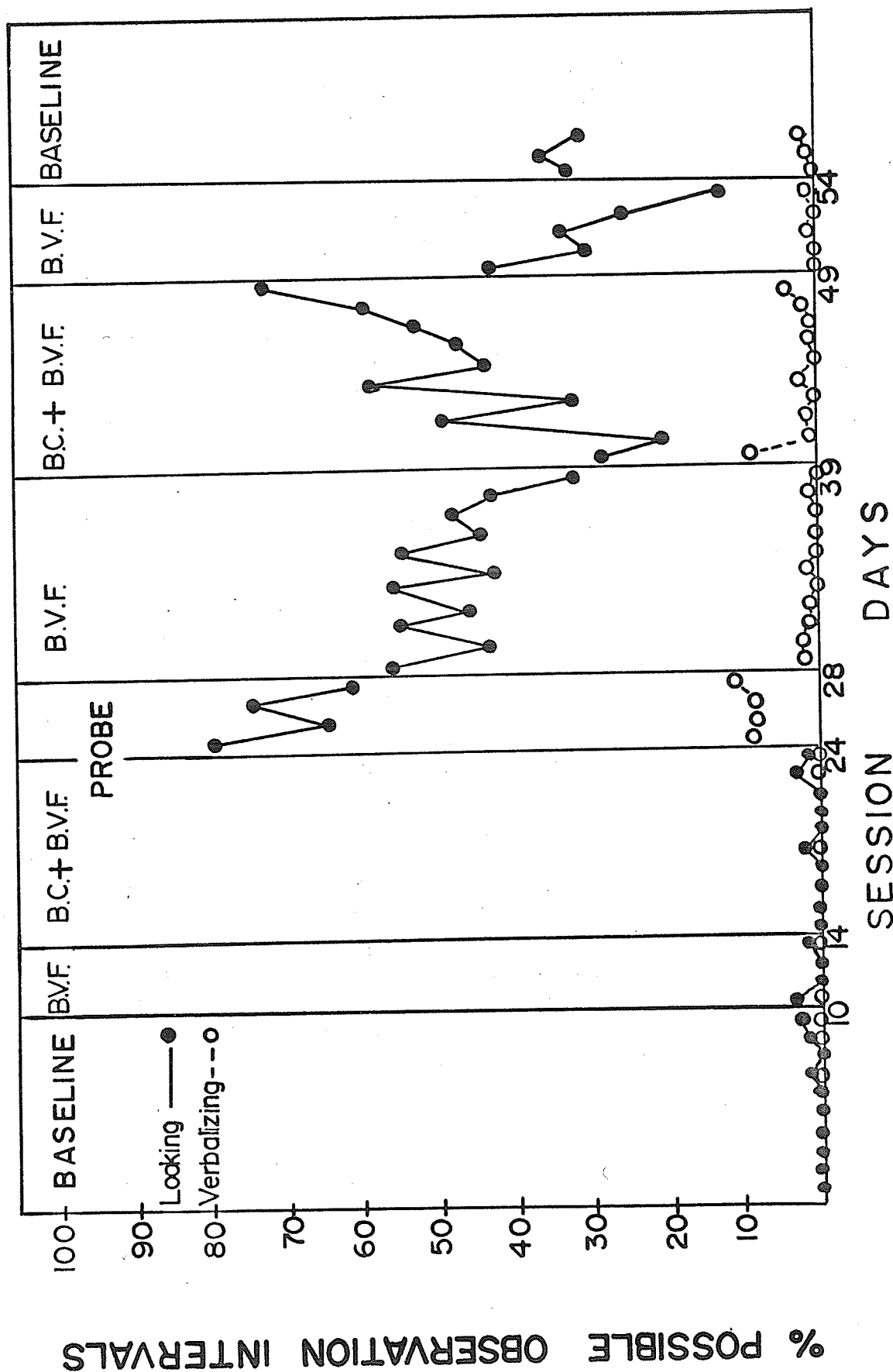


Fig. 7. Frequency distribution of Elizabeth's average "social" interaction per session day. Each data point represents the average percentage of observation intervals in which interactions occurred for two daily twenty minute sessions.

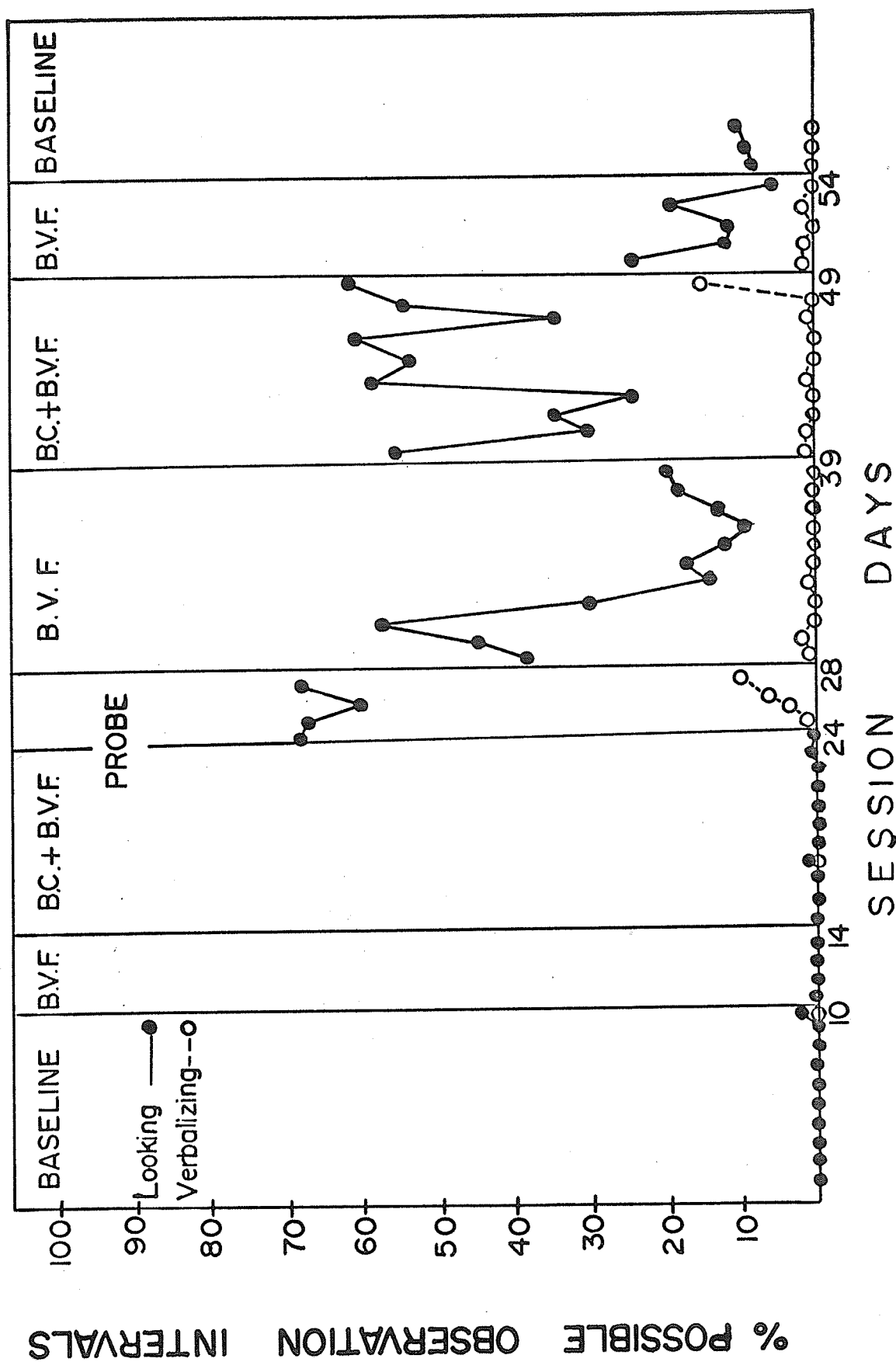


Fig. 8.3 Frequency distribution of Dianne's average "social" interaction per session day. Each data point represents the average percentage of observation intervals in which interactions occurred for two daily twenty minute sessions.

were illuminated by the partner's behavior. Thus, using the female dyad again as an example, Elizabeth would key press ten times but Dianne would receive the verbal feedback paired with her (Dianne's) picture and large red light being illuminated. Dianne would hear "Good girl, Dianne, Elizabeth pressed her key". A button press by Dianne then produced a candy. Elizabeth would receive this type of B.C. and B.V.F. when Dianne responded on her key. The red and green panel lights were advanced as usual.

Results

The B.C. and B.V.F. condition showed no consistent effect across Ss for key responses. As can be seen from Figures 2 and 3, Ralph and Dianne showed a downward trend in responding while Elizabeth responded at a constant but lower rate after the one session and Calvin responded approximately as in the B.V.F. condition.

Social interaction within the male dyad increased after seven days although this was primarily due to the behavior of Ralph (compare Figures 4, 5, and 6). After ten days (20 sessions) of B.C. and B.V.F., the girls continued to show almost zero social interaction. For that reason an experimental "probe" was conducted with the female dyad.

Generalization measures continued with no generalization effect being observed.

Probe Procedure

In the Williams et. al. (1973) backscratch study, Ss could see each other gaining reinforcement from an E who was present in the same room as the Ss. The present design removed or prevented this phenomenon and required an additional response (slider opening), prior to interaction. Since B.C. and B.V.F. produced interaction in both dyads in the Williams et. al. study, the slider was wired open for the girls and interactions during sessions were monitored using the pre-recorded tape and procedure from the generalization

sessions. The probe was introduced at day twenty-four. The probe condition lasted for four days (8 sessions) at which time the conditions were reversed to the B.V.F. condition. The looking behavior of both dyads while the slider was open was stable at the time of change. The co-operation contingency was removed for two reasons, (1) Dianne was again extinguishing the key pressing; and (2) the boys were stabilizing at a relatively high rate of interaction which varied day to day consistently with Ralph being in the right cubicle (as opposed to the left). As Ralph was hemiplegic in his left side he could and did open the slider (on his left) with his right hand and kept it open with his shoulder. This freed his right arm for key pressing. This did not happen when he occupied the left cubicle, and slider openings were at a much reduced rate.

Results of Probe Procedure

While Elizabeth's rate of key pressing increased slightly Dianne's remained at a level comparable to that before the probe (see Figure 3). As can be seen from Figures 7 and 8 the girls began looking at each other about 70% of the possible time. Although verbalizations were not at a high rate they began to occur and to increase. Gestures toward the lights and each other (pointing, not graphed) also began to occur at low levels. While operating under the probe procedure the girls in a general sense increased their interactions. The major variable influencing this seemed to be the opening of the slider and for this reason the slider was wired open for the remainder of the experiment.

The generalization measures for both dyads remained at extremely low levels.

First Reversal to Backscratch Verbal Feedback (B.V.F.)

Procedure

This condition was identical to the first B.V.F. condition except that

the slider was wired open for the female dyad as mentioned above. This condition was terminated after eleven days (22 sessions) for both dyads. Except for the boys' key pressing, all measures had attained stability.

Results

Although Ralph's key pressing responses were at a slightly lower frequency than the previous condition they remained reasonably stable (see Figure 2). Calvin, however immediately increased key press responding to his highest level of approximately 1400 responses/session. The female dyad responded to the reversal consistently with previous findings of Powers and Powers (1971) Ss who increased responding on the work task after a reversal to individual reinforcement conditions. Both Dianne and Elizabeth increased key press responding to near baseline conditions and remained quite stable. (See Figure 3).

Social interaction in the male dyad was unstable and on some occasions scored at higher ratings than any previous condition. (See Figures 4, 5, and 6). This interaction was largely due to Ralph who became preoccupied with the slider and opened it frequently to watch Calvin's lights. Calvin reciprocated on some occasions but in general attended more to his key pressing and his own lights.

In the female dyad, Dianne's looking response decreased immediately to a low rate and Elizabeth's looking response dropped to one half of her looking rate in the probe condition.

Generalization in both dyads remained at extremely low rates on their respective wards.

Replication of the Backscratch Contingency Plus Backscratch Verbal Feedback Procedure

This condition was identical to the B.C. and B.V.F. "probe" condition for the girl Ss (in that the slider remained open for the female dyad sessions). The slider was not wired open for the boys and this condition

was identical to the B.C. and B.V.F. condition. After twenty sessions the interactions of looking had stabilized in both dyads along with Ralph's key responses and the key pressing of both Ss in the female dyad. Calvin's key pressing was not stable after twenty sessions. This condition ended after ten days (twenty sessions).

Results

Ralph's key pressing remained relatively unchanged from the previous condition but Calvin's key pressing response dropped to its lowest rate in the experiment. Elizabeth's key pressing (like Ralphs) remained stable and generally at the same rate as in the individual reinforcement condition. Dianne, however, except for day forty-nine responded at a low stable rate comparable to the first B.C. and B.V.F. condition.

Consistent with Powers and Powers (1971) and Williams et. al. (1973) the second application of the backscratch contingency showed its greatest effect on social interaction within both dyads. The cumulative slider open time for the male dyad reached its highest points in the study on days 45 and 52 (see Figure 4). Occurrences of looking reached its highest peak for both boys and verbalization increased for Ralph while Calvin's rate of verbalization on a few occasions was comparable to previous conditions.

Interactions of looking in the female dyad were also affected. Elizabeth's rate of looking increased generally and after twenty sessions was at the same rate as the previous B.C. and B.C. plus B.V.F. condition. Verbalizations were relatively unaffected in frequency. Dianne's looking although erratic was generally near previous rates under the first B.C. and B.V.F. condition. On the last session day she verbalized at her highest rate.

On several occasions Elizabeth would point to Dianne's panel and say "key" when Dianne was not key pressing for long periods of time. Dianne

it seems was being reinforced for not key pressing as Elizabeth was supplying her (Dianne) with candies at a high rate (see Figure 3).

The generalization observations revealed no interactions on either dyad on their respective wards.

Generalization

The generalization to the ward observation procedure was continued throughout the study until the end of the second B.C. and B.V.F. condition (session 119 for the boys and 98 for the girls). Interaction in both dyads was of such low occurrence that the results are not presented graphically. An increase in a few looks and one verbalization by Dianne during the first application of Condition II was the largest measure of occurrence of "Interaction" on the ward in either dyad. A single occurrence once or twice across all phases of the experiment of a "look" was the net generalization effect.

Second Reversal to Backscratch Verbal Feedback

Procedure

Both dyads were returned to the B.V.F. (instructions alone) condition for five days (10 sessions). This condition lasted only five days as the required experimental personnel were only available for enough days to complete this short reversal and a final return to baseline.

Results

In the male dyad Ralph's key responding remained at its previous rate while Calvin quickly increased in key pressing to levels equivalent to previous B.V.F. conditions (see Figure 2). Similarly in the female dyad Elizabeth key pressed as in the previous condition but Dianne key pressed in a general upward trend scoring on one occasion a rate equivalent of her baseline and first B.V.F. (see Figure 3).

In the male dyad slider openings dropped to near zero. Looking

and verbalization dropped to baseline rates for both boys (see Figures 5 and 6). Elizabeth's looking response was lowered to one-half the first B.V.F. reversal rate and on one day scored lowest of any day since the probe. Dianne's looking was lowered to an equivalent level of the first reversal to B.V.F. Verbalizations for the girls were at extremely low occurrences (see Figures 7 and 8).

Return to Baseline

Procedure

The final return to baseline condition was identical to the first baseline condition for the boys. However, the return to baseline for the girls was different than their original baseline condition. During the girls' first baseline condition the slider was in effect. Later in the study (probe condition) it was wired open and remained open throughout the study and subsequently through the final baseline phase. This phase lasted three days.

Results

Key pressing remained relatively constant for all four Ss. After five sessions social interaction and slider openings dropped to zero for the boys (see Figures 4, 5, and 6). The girls' social interactions remained fairly stable (see Figures 7 and 8).

CHAPTER V

DISCUSSION

The major purpose of this study was to determine the relative effects of B.C. and B.C. plus B.V.F. on social interaction. The data presented support the idea that B.V.F. does not increase social interactions as markedly as when B.V.F. is paired with B.C. for some work task. The strongest effect on social interaction (defined as measures of looking and verbalization) was observed during those conditions when B.C. was paired with B.V.F. and for one dyad on the second application of such a condition. This replicated the findings of Williams et. al. (1973). However, the decrease in the work task observed for two of the Ss in this experiment is contradictory to the findings of Powers and Powers (1971) in that the work performance on the second application of the backscratch contingency was maintained in their experiment for all Ss. It is interesting that the two Ss that showed a decrease in key pressing on the second application of the B.C. and B.V.F. also seemed to be the subjects for whom the reinforcers were more effective. Additionally both of these Ss had the lowest I.Q. scores relevant to their partners.

For the male dyad, social interaction was highest on the second application of B.C. and B.V.F. This phenomenon was also shown in the percentage of session time that the Ss opened the slider. However, the increase in the number of slider openings and the occurrences of looking and verbalizing during the first reversal to the B.V.F. alone condition, may prompt the decision that the increases of these measures on the second application of B.V.F. and B.C. were due to a "trend" effect. The author does not believe this to be the case as all the measures of interaction dropped immediately upon removal of the B.C. and B.V.F. condition.

A striking difference between the results of the present study and those of Williams et. al. (1973) was the lack of a generalization effect in the present study in relation to the Williams study. There would appear to be two explanations for this: (1) The Williams et. al. study used as a work task a learned routine ward behavior (table setting) while the present design used a new task (key pressing); (2) The Williams et. al. study was conducted on the Ss own ward during the daily ward routine (meal times), whereas the present study was conducted on another ward and in a completely new and restrictive environment (the experimental cubicles). Nevertheless, the observed increases in interaction during sessions in the present study under those conditions in which the backscratch contingency was operative, adds strength to the verification of the "backscratch" phenomenon of increased interactions. The observed occurrences of lower rates of interaction during phases in which B.V.F. operated alone, further qualifies the relative effectiveness of backscratch verbal feedback.

In the present study an attempt was made to automate the measuring of social interaction by having a prerequisite response of slider opening. However, as was pointed out previously this effectively eliminated occurrences of looking and verbalization in the female dyad. Although the automation of interaction measures is much needed in this kind of research, it must not be implemented in such a way as to effect interactions or, as in this study, remove interactions completely. Related to this point also is the choice of the type of measure that is to be used as a definition of interaction. From the data presented it would seem that looking and verbalizing are appropriate measures. Further research might measure proximity to the partner, especially if the Ss in question are severely or profoundly retarded. Proximity would seem an appropriate first step

along the approximations to intricate normal human interaction and would appear much superior in ease of measurement when considered in relation to "looking". The problems of using "looking" and even more complex behavior as definitions of interaction become salient when training observers for reliable observations.

It might be argued that there is no way of knowing if the S's could "understand" B.V.F., that is, when S_A hears "good girl A, B pressed her key". How do we know that S_A can discriminate what that verbal behavior means? It is not necessary, however, to worry about whether S_A understands the meaning of this stimulus situation to systematically investigate the effects of this situation on her social behaviors. Thus, such a query is meaningless in such a functional analysis.

In the light of the previous research the following interpretation of the backscratch phenomenon is presented. Perhaps, social behaviors act in a secondary reinforcing function as ~~both~~ discriminative stimuli for responding and as reinforcing stimuli maintaining work task responding (consistent with Sidowski's 1956 analysis). This idea is best understood by analyzing the work and social responding of two theoretical subjects under a backscratch contingency.

Partner A responds socially to Partner B to "cue" Partner B to respond on the work task. Partner B responds and is reinforced by Partner A's social behavior which is maintained by Partner B's work task earning primary reinforcement for A. When interaction promoted by Partner A no longer can maintain the work task behavior of Partner B, Partner A must find some alternative means of earning primary reinforcement. Simultaneously Partner B must do like-wise as work task responding has not been consequted by primary reinforcement. As an alternative response to the work task Partner B may try interaction as a means of

gaining primary reinforcement. Because interaction is extinguishing in Partner A, work task behavior is highly probable and if it occurs it produces primary reinforcement for Partner B which reinforces "cuing" behavior in Partner B. Partner A now responds until interaction from Partner B loses its reinforcing value. Then Partner A's work task behavior deteriorates. Then the cycle is repeated.

If there was no interaction, co-operation would disintegrate as it did with Boren's monkeys. However, it would also be possible for a subject to find the interaction itself rewarding enough that the subject could maintain responding in the face of no primary reinforcement and that primary reinforcement would be used in maintaining the social behavior of the partner ("different strokes for different folks").

If one analyzes two subjects' success on a co-operative schedule by the S's having response rates equal to each other and interaction due to each having some repertoire of "self-control" or delaying reward, then one should not expect the retardate to exhibit a high degree of control on first experience with this type of contingency. The data shows that it takes at least two applications, and further research will show just how many more are effective in increasing social interaction and equalizing response rates. The data on response rates of key pressing presented support a self-control approach to the response exchange co-operative phenomenon in that the two subjects who responded most stably throughout the study also provided the bulk of the interaction. The two subjects whose key pressing fluctuated with the application of a co-operative contingency interacted less. This could have been due to their not discriminating one phase from another due to their not discriminating the "meaning" of the lights and the pictures. However, the S^D S^Δ (consumatory) button press responses seemed to be well learned and S^Δ responses were

made only rarely (data not presented). The major factor seemed to be not discriminating that the partner was indeed getting the reward for one's responding and vice versa. This could have been caused by the fact that instructions were constant throughout the experiment except for baseline conditions. There was no other cue to the relation between the S^D lights and a partner's responding, only to the green lights and one's own responding during the B.V.F. and B.C. conditions. In this sense it was possible for a subject to suppose that his or her key, under the B.V.F. and B.C. conditions, was still somehow responsible for the eventual red light coming on (in a "superstitious" fashion). The two subjects who were successful in realizing that they were earning their partner's lights and vice versa were the only two Ss who "studied" the lights through the glass on various occasions. The two Ss who did not seem to "understand" were the two who paid close attention only to their panel and when looking through the glass were usually oriented in such a way as they could only see their partner and not the other panel.

Skinner (1957), in beginning his functional analysis of verbal behavior stated, "The behaviors of speakers taken together compose what may be called a total verbal episode. There is nothing in such an episode which is more than the combined behavior of two or more individuals".

It is interesting that Keller and Schoenfeld (1950) have defined co-operation as: "The combined behavior of two or more organisms needed to procure positive or remove negative reinforcement for either (page 357). Additionally they stated (1) "each organism's action must be discernible for the others performance and (2) each organism must be reinforced for the part it plays in the co-operative scheme" (page 358).

Additionally Skinner (1969) also stated, "A language is not the

words or sentences spoken in it, it is the it in which they are spoken" (page 12).

Of course there is similarity in the behavioral explanation of these phenomenon. This similarity however has prevented a quicker solution to a current problem; the development of methods for creating what has been referred to in this thesis as social behavior. The problem arises in the multiple or general definitions psychologists have used in studying the subject matter. Social behavior in its broadest sense encompasses a behavioral analysis of co-operative behavior, but similarly co-operation in its broadest sense can be used to define social behavior. To proceed under such conditions causes miscommunication and prevents a further much needed analysis of the social episode.

An alternative view might be to analyze only social episodes. Social episodes could include either communicative behaviors under a functional verbal behavior analysis or co-operative episodes under a functional analysis of individual reinforcement conditions (i.e. reinforcement contingencies operating on a co-operative work task).

An important distinction must be made between co-operation and social interaction when one discriminates that in the natural social environment, individuals emit verbal behavior (not just vocal) to control responses of others in co-operative and competitive tasks in accordance with Keller and Schoenfeld's (1950) definition. A normally functioning organism can effectively increase his repertoire by such responding. However, if a communicative repertoire is not available, much control is lost in partaking in normal co-operative interactions for environmentally produced consequences. Such is the state of affairs for the severely retarded. Only by obtaining a communicative repertoire will

they be able to effectively compete for reinforcement in a normal way by presenting discriminative stimuli to others in their own environment. It seems that a co-operation notion of social behavior is appropriate for analyzing the behaviors of an individual interacting on some task for reward. However, the ability to control that situation to gain maximum reinforcement is in the ability to affect your environment; i.e. affecting other's behavior via social interaction behaviors. It also appears that for the severely retarded the level of interaction is the most basic of pointing, making a noise, touching, etc.

It is for these reasons that further research must be conducted on the effects of the response-exchange contingency, for it seems that this is a natural promoter of socially communicative responses in the low levels of patients. Additionally, it has the feature of accompanying these responses with a co-operation encounter. It appears to promote positive interactions, it needs no rigorous maintenance in application procedures and it reinforces altruistic responding making peers reinforcing in situations where there are few reinforcing agents (namely, institutions).

The development of social interaction in retardates is an immediate, relevant, practical problem. Further information on the relevant parameters of the usefulness of backscratch contingencies in creating interactions would certainly seem desirable. Additional research might clarify the conditions that would maximize the effect of this contingency for interaction, its generality, and persistence.

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