*INDEPENDENT CONTROL OF A PRESCHOOL CHILD'S
AGGRESSION AND PEER INTERACTION BY
CONTINGENT TEACHER ATTENTION¹*

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This study demonstrated the existent role of contingent teacher attention in maintaining a preschool child's aggression to his peers, as well as an imposed use of contingent teacher attention to increase his low peer interaction. Aggression and peer interaction were analyzed independently as two baselines of multiple baseline design; each was subjected to at least one reversal. The multiple baseline design was used to examine three possibilities: (1) that the high rate of aggressive behavior was in itself impeding the emergence of peer interaction; (2) that contingent teacher attention could be used to maintain a reduced rate of aggressive behavior; and (3) that a similar use of teacher attention could maintain an increased rate of peer interaction. The technique of largely ignoring the subject's aggressive behavior and attending instead to whatever child he was attacking decreased his aggressive behavior to an acceptable rate. Two reversals of this technique displayed experimental control, each recovering the high baseline rate of aggression. After the aggressive behavior was decreased for the final time, teachers attended to the subject only when he was involved in social interaction with peers, and they thus increased his social interaction to a high rate. Later, they withdrew their attention for social interaction and reversed the effect and finally then recovered it.

Earlier research has established a rudimentary technology of social reinforcement for the remediation of child behavior problems in preschool settings (Baer and Wolf, 1968; Baer and Sherman, 1970; Sherman and Baer, 1969). Characteristically, these studies chose a single class of deviant behavior for treatment, developed an observable definition of the behavior, recorded it over time, devised a treatment strategy using contingent adult attention, and included a design to isolate the effects of the treatment (Baer, Wolf, and Risley, 1968). Interestingly, however, these studies have rarely dealt with extremes of child aggression.

Certainly there have been attempts to understand and to define aggression behaviorally (Bandura and Walters, 1963), and to develop treatment procedures for it (Birnbrauer, 1968; Bostow and Bailey, 1969; Brown and Elliott, 1965; Patterson, Shaw, and Ebner, *unpublished*; Thomas, Becker, and Armstrong, 1968). Nevertheless, experimental analysis of the maintenance of aggression has not often been forthcoming; and while it is guessed that aggression is often maintained by social reinforcement, a safe technique of extinction has not been described, especially if the subject is causing serious harm to another child. Thus, the tactics for decreasing aggressive behavior have been either to attempt extinction and hope that the consequences will not be as bad as they well might, or to attempt punishment—which, while usually effective, is often aversive to the child, the experimenter, and their audience. This study attempted to offer a third alternative, that of extinction without allowing harm to the victim. Specifically, this alternative requires that the

¹This research was supported in part by a Trainee Fellowship from the National Institute of Mental Health, Grant No. MH 11739-01A1, to the senior author. The authors are grateful to Nancy Rich, Susan Young, Roslyn Kovel Wheeler, and Irine Hwang, for their assistance in the execution of this study. Reprints may be obtained from Elsie M. Pinkston, Department of Human Development, University of Kansas, Lawrence, Kansas 66044.

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aggressor be ignored while the victim is sheltered from further attack.

The other purpose of this study was to investigate the role of teacher attention in increasing preschool peer interactions. However, aggressive behavior was the first target, for practical reasons: the subject was causing injury to other children, who (perhaps for that reason) would not play with him. It was considered possible that once aggression was remediated, the subject's peer interactions would improve, but if this did not occur, the design of the study included methods for accomplishing that outcome as well.

This research involved a multiple baseline technique across the two behavior classes of aggression and peer interaction (Baer, *et al.*, 1968), and also incorporated reversals for both aggression and peer interaction. The multiple baseline design was used for several reasons: to demonstrate whether reduction of aggressive behavior would in itself facilitate peer interaction, to evaluate the role of the contingent teacher attention in changing more than one behavior, and to show that teacher attention can be used selectively and concurrently to maintain a reduced rate of undesirable behavior while increasing a desirable behavior.

METHOD

Setting

The experiment was conducted in an experimental preschool classroom populated by four teachers and 16 preschoolers between the ages of 3 and 5 yr. The day was typically divided into freeplay, large group activities, small group activities, snack time, and outdoor play. Preschool was held from 8:45 a.m. to 11:15 a.m. four days a week.

Subject

The subject, called Cain for this report, was an active 3.5-yr-old boy. His parents were well educated and provided a rich cultural background for the subject and his 4.5-yr-old

brother. Cain's language skills were highly developed and he held long conversations with the teachers in his preschool class. However, his attempts to play with the other children, while frequent, did not often appear to be successful. He would stand on the edge of a play area for a few minutes with his fists clenched, then move into the area and attack other children, apparently indiscriminately. Teachers attempted to stop these attacks, but were bitten, scratched, or hit by Cain (and often told, "I hate you!"). His parents observed this behavior and expressed concern to teachers. It was agreed to reduce his aggressive behavior and to facilitate his interactions with peers.

Overview of Experimental Design

This research employed two reversal designs, within a multiple baseline design, incorporating two behaviors. The first behavior to be treated, aggression, was examined in the following sequence of conditions: baseline (potential reinforcement of aggression by teacher intervention and reprimands), extinction (minimal attention to the aggressor while rescuing his victim), reinforcement (baseline), extinction, reinforcement, and a final extinction maintained until the end of the study. The second behavior, peer interaction, was examined in a long, untreated baseline (until the final extinction condition was applied to aggression), followed by systematic reinforcement of peer interaction, extinction, and a resumption of systematic reinforcement.

Behavioral Definitions

Aggression: an aggression was defined as either a verbal or motor attack by the subject.

Motor aggression included any physically negative behavior directed toward peers and/or materials being used by them.

Definitions of specific motor aggressive behaviors to peers follow:

1. Choking: placing one or both hands around the neck of a peer.

2. Head pushing: pushing the head of a peer, usually by placing one or both hands on the chin of the other person and pushing it back.
3. Biting or threatening to bite: placing his mouth on the body or appendages of another person without first puckering.
4. Pinching: applying pressure to a small area of skin with thumb and forefinger.
5. Pushing: either a quick shove with one or both hands, or a prolonged applied pressure with one or both hands.
6. Poking: pushing a finger or other object into the body or appendages of a peer.
7. Hitting: striking another person with hands or with another object, including throwing an object at another person.
8. Kicking: striking another person or object with a foot or feet.

Examples of motor attacks on peers' materials:

1. Knocking down, kicking, or pushing over structures built or being built by peers.
2. Dumping peers' materials on floor.
3. Spilling peers' milk, water, or other liquids at juice time, or pouring same on peer.
4. Knocking down a structure with other people on it.

Verbal aggressive behavior was defined as any verbalization that threatened, forbade an activity, or indicated a negative judgment about a person, their relatives, or their property.

Examples:

1. "I don't like you!"
2. "You are dumb."
3. "This is our house, you can't play here."
4. "My mother is going to hit you with a big stick!"

Peer interaction: peer interaction was defined as a behavior in which the subject initiated to a peer and was responded to; or was initiated to by the peer and responded.

Episode of peer interaction: an episode of interaction with a peer was a behavioral chain composed of an initiation by either a subject or a peer followed by a response by the other, or a continuous series of interactions emitted by the same two or more persons without interruption of 10 sec or more. An interaction chain could consist of verbal, nonverbal, or simultaneous verbal and nonverbal responses (as long as one of the two or more persons was emitting verbal and/or nonverbal behaviors within each 10-sec interval). However, all aggressive behaviors were counted as episodes of peer interaction, even if not completed interactions.

Teacher attention: any time the teacher verbalized to, touched, or handed something specifically to the subject or a peer with whom the subject was interacting. This did not include attention to a group peer unless part of that attention was specifically directed to the subject.

The above behaviors were the most important behaviors recorded in this research. The observation code was taken in large part from the University of Kansas Head Start Social Interaction Observation Code (LeBlanc and Etzel, *unpublished*).

Observation and Recording

An observer equipped with clipboard, recording forms, and stopwatch recorded the child and teacher behaviors. She remained close to the subject, without interfering with his activities, and did not interact with him or other children in any way. All behaviors that occurred within a 10-sec interval were recorded by entering a coded tally mark in the appropriate 10-sec cell of the recording form. Observations were recorded four days a week for approximately 1.5 hr per day: during freeplay, small group activities, and outdoor play (periods in which the subject had the maximum opportunity to interact with his peers).

Reliability

Interobserver reliability was checked 11 times, at least once per experimental condition. Agreement was evaluated during each condition for each of the following behaviors: aggression, peer interaction, teacher attention, teacher attention to episodes of aggression, teacher attention to episodes of peer interaction. Agreement of these independent records was scored interval by interval; this scoring was restricted to those intervals in which one or the other observer recorded the behavior of interest. The percentage of agreement for the recorded behaviors was calculated as $100 \times (\text{agreements})/(\text{agreements} + \text{disagreements})$.

Procedures

Baseline: aggressive behavior (Days 1 to 7). The subject was observed for seven days without systematic intervention. During this time, teachers responded to Cain's aggressive behavior as they normally would. Typically, this took the form of verbal admonitions or reproofs such as: "Cain, we don't do that here," or "Cain, you can't play here until you're ready to be a good boy!" As predicted, a high percentage of the subject's interactions with peers was aggressive; therefore treatment was implemented.

Extinction: (Days 8 to 16). During treatment, the teachers did not attend to Cain's aggressive behavior, except to separate him occasionally from his target. The teachers were signalled by the observer that aggression to peers was occurring. They immediately attended to the peer or peers whom Cain was attacking. Attention directed to the peer took the form of statements such as: "I'm sorry that happened to you. Why don't you play with this nice truck?" Teachers were instructed to attend to Cain's positive behaviors, in order to maintain a similar total input of attention throughout all conditions for both baseline behaviors. (A record was kept of those children who received teacher attention subsequent to subject aggression, to avoid sys-

tematically reinforcing whining or baiting behaviors in these children.)

Reinforcement (Days 17 to 24). Teachers again attended to Cain's aggressive behavior, setting limits, reprimanding him, or reasoning with him. Essentially, this was a return to baseline.

Extinction (Days 25 to 29). This condition was the same as during the previous extinction procedures, *i.e.*, the peer being aggressed against was attended to while the subject was ignored; the subject was attended to later after emitting an acceptable behavior.

Reinforcement (Days 30 to 32). Again Cain's aggressive behavior was reprimanded, *etc.*, as it had been during the baseline condition.

Extinction (Days 33 to 63). As in the previous extinction procedures, the target child was attended to while the subject was ignored; then, the subject received attention later after emitting an acceptable behavior.

Baseline: peer interaction (Days 1 to 33). This baseline was recorded concurrently with the aggression baseline and manipulations. During this period, teachers had no instructions to attend or not attend to the subject's peer interactions. Records showed they did attend, but very intermittently.

Reinforcement (Days 33 to 51). Teacher attention for Cain's peer interaction was increased and other teacher contacts with him were decreased. Thus, when Cain initiated a conversation with a teacher, she answered him briefly, but excused herself as soon as possible. The teachers directed Cain to other children's play activity or suggested that others include him in their play to prompt peer interaction.

Extinction (Days 51 to 55). Systematic reinforcement of Cain's peer interaction was discontinued. Also, if Cain initiated a conversation with the teachers, they responded and continued the conversation, if Cain remained with them. This condition served as a reversal control procedure.

Reinforcement (Days 56 to 63). Teachers again attended more frequently to Cain when he was engaged in social interaction with a peer or peers, and limited their other contacts with him,

as before, until a high rate of social interaction was recovered. Toward the end of this condition, teacher attention for social interaction was reduced to approximate a normal level (judged important to a durable effect after the formal procedures ended). They were aided in this by daily inspection of graphs of their attention to the subject during his interaction with peers.

Postcheck. A postcheck observation was recorded a month later. No specific procedures were scheduled; all measurements were made as they had been during the previous days of the study.

RESULTS

Reliability of measurement ranged between 76% and 100% observer agreement. These results are shown in Table 1 for each behavioral category of interest.

Table 1

<i>Behavior</i>	<i>Range</i>	<i>Mean Percentage</i>
Aggression	83% to 100%	92%
Peer Interaction	76% to 100%	86%
Teacher Attention	82% to 98%	90%
Teacher Attention to Episodes of Peer Interaction	80% to 100%	95%
Teacher Attention to Episodes of Aggression	85% to 95%	89%

The effects of contingent teacher attention on the subject's aggression and peer interaction of the subject are shown in Figure 1. Because aggression was a subclass of peer interaction, aggressive behavior was plotted as a percentage of the time during which any form of peer interaction occurred, rather than as a percentage of the total intervals observed. However, aggression was also monitored throughout the study as a rate, *i.e.*, as a percentage of total intervals observed, to avoid spurious conclusions: as a percentage of peer interaction, aggression might have appeared to decrease when in fact it remained constant or increased, if other forms of

peer interaction increased greatly at the same time. Identical results supporting identical conclusions resulted from both analyses; therefore, aggression as a percentage of peer interaction is reported below as the more meaningful of the two scores. Peer interaction was plotted as a rate, *i.e.*, as a percentage of the total time observed.

Aggressive behavior was markedly and promptly reduced by the experimental manipulation of ignoring the subject and attending to the victim (Extinction). The baseline showed a high rate of aggressive behaviors, averaging 28% of total peer interaction. When the extinction condition was instituted, a downward trend in subject aggression resulted. In the final four days of this condition, aggression averaged only 6% of the subject's peer interaction. The behavior was again recorded in the reinforcement condition, with an upward trend appearing in the last days of the condition. In the second extinction condition, there was again a rapid downward trend, the final three points averaging less than 2%. Subsequent reinforcement again recovered the aggression to approximately 25% across the three days of the condition. In the final extinction condition, aggression declined to a final average between 0% and 5%. After a month, a postcheck indicated aggression was only 3% of Cain's peer interactions.

Similarly, peer interaction was also changed significantly by the experimental manipulation of teacher attention contingent upon peer interaction. The baseline was variable, ranging between 1% and 25%, and was not systematically affected by the treatment of aggression. However, it did suggest a long-term, downward trend to a 10% average. The first reinforcement condition produced an upward trend to three final points of 33%, 32%, and 30%. A quick reversal to the baseline level was achieved in the extinction condition. The final reinforcement condition immediately recovered the behavior to an average level of 35%. The postcheck, a month later, yielded a one-day estimate of 43%. The mean

Fig. 1. Subject's daily aggressive behaviors as a percentage of all peer interaction observed (top), and his daily peer interaction as a percentage of time observed (bottom).

levels of teacher interaction during Reinforcement, Extinction, and Reinforcement were 21%, 31%, and 16%, indicating that the teachers increased their attention to behaviors other than peer interaction during extinction.

Figures 2 and 3 display the temporal relationships between teacher attention and the child's aggressive responses, and teacher attention and the child's peer interaction, respectively.

Figure 2 shows the probability of teacher attention accompanying or following episodes of aggression, for the six successive 10-sec intervals following the onset of each aggression. To calculate these probabilities, each onset of aggression was surveyed, and any occurrence of teacher attention in that 10-sec interval (labelled as the

0 interval in Figure 2), or in any of the five intervals following it (intervals 1, 2, 3, 4, and 5) was noted. These occurrences of attention were then expressed as a percentage of the intervals surveyed, yielding a probability of attention per interval. This was calculated twice: once for aggression during all Baseline-Reinforcement (of aggression) conditions (Days 1 to 7, 17 to 24, and 30 to 32), and again for all Extinction (of aggression) conditions (Days 8 to 16, 25 to 29, 33 to 63). During the combined Baseline-Reinforcement conditions, the peak probability of teacher attention (28%) occurred immediately with the onset of aggressive responses, *i.e.*, in the 0 (same) interval. This was in contrast to the combined Extinction conditions, in which the

Fig. 2. Probability of teacher attention in the six successive 10-sec intervals following each instance of the onset of aggression.

probability of teacher attention was low (about 8%) throughout the six intervals.

Figure 3 shows the percentage of episodes of peer interaction that gained teacher attention. During the Baseline condition, teacher attention to peer interactions ranged from 4% to 24%, averaging 13%. In the first reinforcement condition, the probability of teacher attention gradually increased to an average of 20%, during the first 14 days of this condition. After a graph of their attention behavior was shown to the teachers on the fourteenth day of the condition, the level of teacher attention to the subject's peer interaction increased abruptly, ranging then between 41% and 61%. In the subsequent Extinction condition, the probability of teacher attention averaged about 8%; but when the reinforcement condition was reinstated, it promptly recovered to a 52% average for four days. The probability of attention for peer inter-

action was gradually reduced according to plan, yielding final points of 47%, 46%, 23%, and 31%. The one-month postcheck point was 32%.

The rate of total teacher attention to Cain, considered as a percentage of the total intervals observed, was relatively stable throughout the study. The overall mean of teacher attention was 26%, the mean percentage of each condition ranged only from 21% to 38%.

DISCUSSION

Clearly, the extinction technique was effective in greatly reducing the amount of aggression. Experimental control was demonstrated twice by reversing the Extinction procedure through the Reinforcement procedures, in which the baseline level of aggressive behavior was recovered. Thus, teacher attention to this response was apparently responsible for the maintenance of aggression; the redirection of teacher atten-

Teacher Attention to Episodes of Peer Interaction

Fig. 3. Percentage of episodes of peer interaction attended to by teachers.

tion, implicit in the Extinction conditions, led to its decrease. Alternatively, it is possible that the systematic giving of teacher attention to Cain's victim had a punishing function for his aggression. This possibility was considered implausible in Cain's case, but cannot be denied without further research. Nevertheless, the practical value of the "Extinction" technique remains the same (whether its present label is thoroughly accurate or not).

Similarly, the notable increase in subject interaction with peers was functionally related to teacher attention contingent upon that behavior. This was demonstrated by the Extinction condition, during which removing systematic attention from peer interaction yielded a quick reversal.

At the onset of the reinforcement manipulation, teachers did not attend to the social interactions of the subject at a sufficiently high rate. This was discussed during a staff meeting with little resultant change in teacher behavior. Consequently, on Day 46, a graph of teacher attention to episodes of peer interaction was presented, and on the following day teacher attention to episodes of peer interaction increased markedly. Similar graphs were purportedly helpful in reducing teacher attention during the last Reinforcement condition. Since showing graphs to teachers was not experimentally controlled, no firm statements about its function are possible. However, recent reports of similar procedures (*e.g.*, Cooper, Thomson, and Baer, 1970) suggest that the usefulness of this technique should be investigated further.

Further analysis of these data showed that total teacher attention was relatively constant throughout the study, thus demonstrating that simple increases or decreases in total teacher attention were not the controlling variables in either the aggression or peer interaction changes. Rather, the contingency between teacher attention and the child's behaviors was the controlling factor in changing these behaviors.

It will be noted that during the peer inter-

action baseline, aggression had undergone the ABABA stages of its ABABAB reversal analysis. Thus, the ensuing analysis of peer interaction by social reinforcement techniques was independent of the aggression analysis. However, the analysis of peer interaction took place during a time of stable low aggression, and thus was not necessarily independent of the rate of aggression. That is, results might have been different had the same technique been applied during a time of high-rate aggression.

Thus, it is evident in both cases that manipulation of teacher attention, as a consequence of the response or its counterpart, was a controlling factor in causing the behavioral change. This contingency control was strongly supported by using a multiple baseline design, with reversals of both baselines. It should be noted, that in both cases the experimental change did not occur until teacher attention was manipulated. Although it was more relevant to the behaviors being investigated to graph an increase in one and a decrease in the other (instead of the usual concordant graphic presentation of multiple baseline designs), the essential components of a multiple baseline were still present. How they are presented does not alter their function in the study. The components that were stable in both phases were: child, setting, and treatment, the treatment being a manipulation of teacher attention in both cases, with emphasis on its extinction aspects in one case and its reinforcing aspects in the other.

The initial focus of this study was to develop a practical extinction-like technique for the modification of dangerous behavior (such as aggression). The resulting technique was successful in reducing aggression without allowing harm to the target child. Therefore, an alternative to the usual punishment procedure for modifying aggression was provided (although this technique could be harboring a gentle punishment contingency of its own). The extent to which this can be applied to other settings and other populations should now be investigated.

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Received 22 February 1972.

(Revision requested 1 May 1972.)

(Final acceptance 31 July 1972.)