

A Peek Behind the Fence: Naturalistic Observations of Aggressive Children With Remote Audiovisual Recording

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This article describes a methodology that is uniquely suited to study peer interactions, particularly those of aggressive children. To date, researchers have used laboratory and naturalistic observations to investigate children's aggressive interactions. To overcome difficulties such as the constraints of laboratory situations and reactivity to proximal observations, video cameras and wireless microphones were used in a study of the peer relations of aggressive and nonaggressive children. Details about the equipment and procedures are provided, along with logistical and ethical considerations. Remote audiovisual observations provide a unique opportunity to observe children's interactions that generally occur beyond adults' view. The primary strength of this observational methodology is its external validity. Children being observed are completely mobile on the school playground and are able to choose the activities and partners for their play. The effectiveness of this methodology is illustrated with results from our studies of children on school playgrounds.

Researchers have identified peer relations as an important mechanism in the development of adaptive and maladaptive behaviors (e.g., Hartup, 1983; Parker & Asher, 1987). In the case of aggressive children, peer interactions are presumed to exacerbate behavior problems and propel these children along the trajectory to an antisocial lifestyle (Cairns, Cairns, Neckerman, Gest, & Garipey, 1988; Patterson, DeBaryshe, & Ramsey, 1989). The study of aggressive children's peer relations has taken many forms: self-reports, peer reports, and adult reports; laboratory paradigms; and naturalistic observations. At present, there are gaps and inconsistencies in our understanding of the peer relations of aggressive children because of methodological issues such as the lack of agreement between raters (Loeber, Green, Lahey, & Stouthamer-Loeber, 1989), the constraints of laboratory situations, and the difficulty of naturalistic observations with school-age children (Asher & Hymel, 1981). To overcome some of these methodological difficulties, we used video cameras and remote microphones to observe peer interactions of aggressive and nonaggressive children on the school playground. In this article, we discuss observational methodologies commonly used in the study of children's aggressive behavior, review the strengths and weaknesses of each methodology, describe our alternative observational strategy, and illustrate its effectiveness in addressing the challenge of naturalistic observations of aggressive children on the school playground. Even

though the present discussion focuses on our use of the methodology to study aggression, it would lend itself to the study of many other aspects of peer interaction (e.g., friendship patterns, social support, prosocial behavior, victimization, and discourse analysis).

The paucity of research on the unstructured free play of school-age children may be attributable, in part, to the difficulty of obtaining observations. Whereas younger children can be observed during extended periods of free play with peers in a pre-school setting, elementary school children seldom have unstructured play periods in class. On the school playground, children's free play tends to be diverse and wide-ranging. It varies from overt physical activity to subtle and private interactions and may occur anywhere on large school playgrounds. Nevertheless, the school playground is an ideal venue for studying naturalistic peer interactions and processes. Children spend a substantial portion of their school day on the playground, during which time they are free to choose their play partners and activities. Children's playground behaviors are markedly understudied even though they have important implications for development (Pellegrini, 1993).

Researchers have overcome the difficulties of observing school-age children's social interactions in a variety of ways, both in controlled laboratory and in unstructured free-play settings. The advantages and limitations of several observational strategies are briefly delineated below with reference to the study of children's aggressive interactions.

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Laboratory Observational Studies

Observational studies in laboratory or contrived play group situations have substantially augmented our understanding of aggressive children's peer interactions (e.g., Dodge, Coie, Pettit, & Price, 1990). There are several advantages to this methodology. In the laboratory, the experimenter has control over the children involved, the materials, the space for play, and the du-

ration of the play period. Interactions can be easily heard and seen, thus providing high internal validity.

The primary limitations of laboratory methodologies relate to external validity: Interactions in contrived play groups may not be representative of children's everyday peer interactions. The presence of an adult and controls in the physical setting may constrain children's behavior and compromise external validity. The number and characteristics of peer partners may also influence aggression observed in a laboratory setting. In natural settings, aggressive children tend to affiliate with groups of similarly deviant peers; these peer groups may be breeding grounds for subsequent antisocial behaviors (Cairns et al., 1988; Patterson et al., 1989). Peer processes such as social contagion, modeling, and reinforcement likely influence the frequency and nature of children's aggression (Coie & Jacobs, 1993; Olweus, 1987). In summary, laboratory settings offer unique opportunities for controlling and assessing developing peer relations; however, the potential contextual effects of laboratory play groups raise concerns for their generalizability.

Naturalistic Observations

With minimal constraints on children's interactions, the results of naturalistic studies can be generalized to real-life situations more confidently than those of laboratory studies (Attili, 1985). Furthermore, it would not be ethically possible to recreate some everyday interactions in the laboratory. For example, staging intense and prolonged bullying episodes such as those observed on our playground tapes (Craig & Pepler, 1994) would be unethical because of the stresses that children would experience. Consequently, naturalistic observations may be the only ethical means to study certain aggressive behaviors. Before describing our observational strategy, we consider the strengths and limitations of two other techniques that have been used to study children's aggressive interactions on the school playground: proximal observations and observations conducted with video or audio recordings.

Proximal Observations

Researchers have typically used live observational coding systems to study children's playground behaviors (Asher & Gabriel, 1993). Coders follow children on the playground to record their interactions with checklists, written or dictated running descriptions, or handheld computers (e.g., Coie & Dodge, 1988; Sluckin, 1981). Within preschool settings, proximal observations of peer groups are more reliable than observations coded from videotape, because coders can make discriminations on the basis of the full context of the behavioral interactions (Fagot & Hagan, 1988). On the school playground, however, the wide-ranging and subtle nature of children's play poses difficulties for proximal observations and limits the detail within coding systems (Asher & Hymel, 1981; Putallaz & Wasserman, 1989).

Reactivity to the observer's presence is a concern with proximal observations, with the corresponding dilemma of choosing the optimal distance from which to observe. If observers are too close, children may be reactive and restrict their interactions. If observers maintain distance to minimize reactivity, they may not detect verbal behaviors of interest, such as threats or insults,

which are often brief and covert. Our observations of school-age children suggest that verbal behaviors comprise the majority of aggressive initiations on the school playground (Pepler, Craig, & Roberts, 1993). The ability to detect verbalizations may be particularly critical for investigations of aggression by girls, who are more likely than boys to engage in verbal as compared with physical aggression (Lagerspetz, Bjorkqvist, & Peltonen, 1988). Hence, the distance an observer maintains from the interaction may compromise the validity or quality of data.

There may be a limited age range for the use of proximal observations of naturalistic interactions. With age, children's aggression develops from physical to direct verbal aggression to indirect aggression (Bjorkqvist, Osterman, & Kaukiainen, 1992). The latter forms of verbal and indirect aggression are subtle and may be difficult to detect with proximal observations. Furthermore, as children become more cognitively and socially mature, they may restrict their aggressive interactions when being observed (Lagerspetz et al., 1988). Similarly, as children become increasingly aware of the expectations and rules regarding aggression, they may be more likely to hide or avoid aggressive interactions when under scrutiny. On the basis of his observations on the school playground, Sluckin (1981) noted that older children were more aware of his interests and more protective of their privacy than younger children. The external validity of proximal observations, therefore, may be inversely related to the age of the children being observed.

In summary, the external validity of naturalistic proximal observations is generally stronger than that of laboratory studies. On the other hand, proximal observations raise concerns for reactivity to the observer, the quality of obtainable data, and the age appropriateness of the observational strategy. Some of these concerns are minimized with video or audio recordings.

Video or Audio Recordings of Social Interactions

Reactivity can be minimized by videotaping children on the playground from an unobtrusive position in the school (Serbin, Marchessault, McAffer, Peters, & Schwartzman, 1993). Children take little notice of the observers and are not aware of the individual targets of filming. The drawback of this video-only methodology is that children's conversations cannot be recorded. The lack of information on the verbal interactions seems particularly problematic for research on aggressive behavior, which is often preceded by a verbal instigation (Coie, Dodge, & Kupersmidt, 1990). Video-only recordings, therefore, may provide an incomplete account of the complex nature of aggressive interactions among school-age peers.

An alternative observational strategy is to use audio recordings accompanied by a predetermined coding scheme, narrative, or video recordings (e.g., Abramovitch, Corter, Pepler, & Stanhope, 1986; McCabe & Lipscomb, 1988). Audiotapes are transcribed and merged with behavioral records for interactional coding. Audiotaping has several advantages over live observations when the research interests comprise verbal interactions (Asher & Gabriel, 1993), and audio recorders are less expensive than video equipment.

Limitations in the use of an audio record arise in the accuracy of the accompanying behavioral record. Narrative or pen-and-paper behavioral records may not be adequate to capture

the subtle and rapidly occurring behaviors of interactions among school-age children. For example, the use of knives on our school playground tapes was so covert that it often took several passes through the audiovisual tapes to discern their presence. Although aggressive behaviors such as these may be low base rate events and very covert, they are nevertheless important in understanding the complexities of life on school playgrounds in the 1990s.

Remote Audiovisual Observations

To observe naturalistic peer interactions of aggressive children in an unobtrusive yet externally valid manner, we developed a methodology using wireless microphones and video cameras. With this equipment, we were able to see and hear all aspects of children's interactions on the school playground. This methodology offers a unique opportunity for researchers interested in children's social interaction to gain access to a world not normally privy to adults. The target child wears a wireless microphone and a lightweight transmitter, which detect the speech of the target child and the speech of children with whom the target child is interacting, despite their distance from the camera. With a zoom lens on the camera, the researcher can remain remote from the target child while recording the child's behaviors at close range. This technology offers all the benefits of videotaping, including the ability to code in fine detail, code interactive behavior, review repeatedly, and train extensively for observer reliability (Coie et al., 1990). A significant benefit of the remote technology is that target children are free to roam on the playground, far from the camera, thereby decreasing reactivity.

Equipment

In developing this methodology for our observational study of aggressive and nonaggressive children on the playground (Pepler, Craig, & Roberts, in press), we experimented with three generations of microphones before achieving reliable recordings. When children played near metal fences, near the playground equipment, or at the outer edges of the school yard, the metal interfered with the FM transmission. We overcame these difficulties with a true diversity, dipolar remote microphone system. The system operates on dual FM radio frequencies so that when one signal fails, the other signal is automatically transmitted.

The TELEX true diversity systems, which we purchased for approximately \$700 per unit, comprise a small microphone, a transmitter, and a receiver.¹ The microphone is approximately 2 cm long and is connected with a thin wire to a transmitter that measures 7 × 10 × 2 cm and weighs approximately 150 g. We made pouches for the transmitters that hung around the children's necks or fastened around their waists. The microphone attached to the children's clothing with a clip. The equipment was relatively unobtrusive during the fall and winter when the transmitters were placed inside the target children's coats. In the late spring, however, the transmitters were visible, making it evident which children were being observed. The challenge of unobtrusive observations is addressed later.

The receiver, with two antennae to receive both channel

transmissions, was located beside the video camera. We videotaped the target children's playground interactions with an 8-mm SONY Camcorder fitted with a telephoto lens and mounted on a tripod. The audio signal was fed directly into the camera for a simultaneously recorded video and audio record. Although a light on the receiver indicated whether the sound was being received, we found it essential to monitor the sound transmission with earphones plugged directly into the receiver. The advertised range for this system is 300 m in open field conditions or 80 m in adverse conditions. With the critical feature of dual audio transmission channels, this system worked reliably and provided complete remote audiovisual recordings of children's naturalistic interactions on the playground.

Procedure

We conducted observations at two schools with playgrounds that measured approximately 70 × 100 m. The camera was set up in classrooms overlooking the playground. Two observers were required at all times: One researcher operated the camera, and the other researcher remained on the playground to place the microphones on the target children and assist in tracking them. The researcher on the playground carried a list of names of children to be observed. On locating a target child, the researcher approached the child and asked whether he or she would be willing to wear the microphone for a period of 10 min. The researcher then switched on the transmitter, placed it on the child, and clipped the microphone to the child's clothing. Children were instructed to play as they normally would. All children knew they were being filmed. In the course of conversation with the child, the researcher mentioned the child's name and identified the color of the child's clothes. This identifying information was essential to track target children among the approximately 250 children on the playground.

Equipment and Procedural Considerations

In addition to reliability of the audio transmission, we had several other concerns in selecting equipment for the playground observations. First, we were concerned that the children, especially the aggressive boys involved in rough-and-tumble play and skirmishes, might be too rough with the equipment. In spite of highly active and aggressive play, the transmitters were not damaged during 72 hr of playground observations.

Given that the microphones and transmitters identified the focal children in any observation period, we were concerned about children's reactivity to being filmed. Similar to Asher and Gabriel (1993), we observed only occasional and brief reactivity to the remote audiovisual system, such as a comment about the observer, microphone, or camera, or a brief glance in the direction of the camera. In a subsequent study of bullying, we assessed the extent of the reactivity problem. Observers rated the children's reactivity on a scale from 1 (*not at all reactive*) to 5 (*highly reactive*). These global ratings indicated that children were reactive to the camera and microphone in fewer than 10%

¹ Names and addresses of companies that supply wireless microphones can be obtained by writing to Debra J. Pepler.

of the episodes (Craig & Pepler, 1994). A possible explanation for the low levels of reactivity is that elementary-age children are not capable of sustained self-monitoring, particularly when the camera is operated from a remote location.

In subsequent research, we have addressed concerns regarding reactivity and identification of the children being observed. Borrowing from the methodology of Hinde and his colleagues (R. Hinde, personal communication, July 6, 1991), we now place live microphones on the target children being observed and dummy microphones on all other children in their classes. For the 120 dummy sets, we used a wooden block to simulate the transmitter and a small metal plug to simulate the microphone. The transmitters are placed in commercially available waist pouches that are sewn closed. The microphone is sewn into a pocket that attaches to the child's clothing with an alligator clip. The dummy sets were virtually indistinguishable in appearance from the actual transmitters and microphones.

Another procedural consideration of filming is the camera placement to maximize the field of view and minimize reactivity. During unstructured play times, children move freely around the school yard and occasionally move out of the camera's field of view (e.g., close to the wall, around a corner). As a consequence of not controlling children's movements, we lost approximately 4% of our observations because of children moving out of the field of view. In some schools, it is not possible to view the entire school playground from a second-floor classroom location. Under these circumstances, it is necessary to film from a position on the playground.

Finally, tracking the target child continuously among 250 other children on the playground is difficult given the limited view through the camera lens. One solution to this problem is to attach a small colored television monitor for additional clarity. We chose less expensive walkie-talkies for communication between the camera person and the researcher on the playground. An advantage of this communication link is that the researcher on the playground can provide information on the whereabouts of target children without having to approach and signal which child is wearing the live microphone.

Reliability and Validity

To date, our playground tapes have been analyzed with two coding schemes adapted from the Playground Code of Rusby and Dishion (1991). The first microsocial coding scheme comprised two stages: coding of play states and a fine-grained coding of behaviors with affective valence (Pepler et al., in press). The social overtures and responses of peers to the target children were also coded. Kappa coefficients were calculated for the frequencies, durations, and sequences of states and events with a 5-s tolerance interval. Kappas were .76 for state coding and .69 for event coding. The second coding scheme was used in an analysis of bullying on the school yard. Bullying episodes were identified with 93% interobserver agreement. The average agreement for coding contextual variables (e.g., peer roles, type of aggression, and gender of bully) was 93%. Two variables, height and weight, could not be coded reliably from the tapes.

Validity of the observations is supported by their ability to differentiate the playground interactions of aggressive and non-aggressive children (Pepler et al., 1993) and their relation to

other measures of aggression. There was a significant correlation between children's verbal aggression and teacher ratings of externalizing behavior problems, $r(39) = .41, p < .01$, and a trend for the relation with peer ratings of aggression, $r(39) = .24, p < .15$. Global ratings of physical aggression observed on the tapes correlated with rates of verbal and physical aggression, $r(39) = .31, p < .05$ and $r(39) = .34, p < .04$, respectively.

Ethical Issues

We encountered several ethical concerns in developing the remote observational methodology: obtaining consent, duty to report, and limits of communication. The advantage of remote naturalistic observations is that children's behaviors are not constrained. At the same time, children other than those targeted for the research may enter the camera frame. Their presence poses a problem with respect to obtaining informed consent. One solution is to obtain consent for all the children in the school. If some parents do not consent to their child's participation, the researcher is obliged to avoid gathering data on these children. It may be possible to discard film segments with children for whom there is no consent or to prevent these children from going onto the playground during filming. The former strategy requires the costly and difficult task of identifying all children. The latter strategy places artificial constraints on children's interactions: Friends of the target may not be present on the playground. Under these circumstances, the disadvantages are similar to those for contrived play-group situations in which the external validity of the observations is jeopardized. Because the research projects in which we have used this methodology have all been integral to intervention and prevention programs being offered within the school, we have been able to obtain *in loco parentis* consent from the school principal for those children not directly involved in the observational research. Within pure research studies, however, the task of obtaining consent for all children may be too formidable to make this methodology viable.

Teachers and supervising adults must also be informed about the nature of the research. If some of these adults do not consent, the aforementioned strategies may be used. For example, teachers who do not consent might be removed from yard duty during filming.

A second ethical issue concerns duty to warn (for fuller discussion, see Fisher, 1993). In conducting observations of aggressive children's playground interactions, one may observe interactions in which children's safety is a concern (e.g., extreme aggression or weapons). Coie and his colleagues (Coie et al., 1990) acknowledged a similar concern within a laboratory situation. Researchers, in conjunction with the school staff, can develop definitions of situations that merit duty to warn and procedures to be followed. These procedures should address the ethical responsibility of duty to warn, while at the same time maintaining the integrity of the research. We developed procedures to inform the supervising adults on the playground concerning harmful and dangerous behaviors. This strategy protected the children, while at the same time alleviating direct involvement by the researchers.

A final ethical concern is clarifying the limits of communication (Fisher, 1993). To ensure confidentiality for the children

and teachers filmed, we did not show our tapes to the school staff, children, or parents involved in the study. Hence, the schools were not able to use the tapes as a form of surveillance to assess, diagnose, or determine treatment plans for individual children. The consent form specified that the tapes would be used for research and educational purposes only.

A Peek Behind the Fence

Remote audiovisual observations provide a unique opportunity to observe children's interactions that generally occur beyond our view. The primary strength of this observational methodology is its external validity. Children being observed are completely mobile on the school playground and are able to choose the activities and partners for their play. Aggression is thought to occur relatively infrequently on school playgrounds (Hartup & Laursen, 1993). With the ability to "peek" into the playground, we were able to observe the full range of aggressive behaviors and to determine that aggression is not a rare event. Aggressive children were observed to be verbally and physically aggressive once every 3 and 8 min, respectively. Nonaggressive children were observed to be verbally and physically aggressive once every 5 and 11 min, respectively (Pepler et al., 1993). The remote audiovisual observations allowed fine-grained analyses of affect associated with each behavior, which further differentiated the aggressive and nonaggressive children (Pepler et al., 1993). This observational methodology provides a complete record of the behaviors and verbalizations of both the target children and those around them. With this rich, naturalistic view, we were able to observe some subtle forms of aggression, typically associated with girls' aggression. The efficacy of this methodology was apparent in our study of bullying on the playground. Although significantly fewer girls than boys admit to bullying on surveys (Pepler, Ziegler, & Charach, 1994), we observed girls bullying at the same rate as boys (Craig & Pepler, 1994). Studies of girls' aggressive behaviors are notably scant, perhaps because we lack the appropriate tools for detecting and understanding girls' aggression. This methodology, which captures the subtle forms of verbal and indirect aggression, may prove particularly effective in our attempts to understand the complexities of girls' aggression.

There are several limitations associated with this methodology. First, as in any naturalistic study, experimental control is sacrificed to observe behavioral interactions as they unfold in everyday life. Second, the equipment cannot be easily switched from one child to another for frequent time sampling. On the other hand, with remote observations, we have observed occasional long episodes of aggressive interactions, such as bullying. Finally, there appears to be a ceiling for the age at which this is a suitable methodology. The oldest children in our studies (11 and 12 years of age) appeared to be more aware of the equipment and more self-conscious than younger children, and a few of the older children were reticent to be observed. The various validity and ethical elements of this methodology must be considered within the specific contexts of a given research program.

In summary, the remote audiovisual observational methodology provided continuous event sampling that could be analyzed according to the frequency, sequence, and affective intensity of behaviors initiated and received by the target children.

This methodology may be uniquely suited for the naturalistic study of aggressive and other interactions among school children. While laboratory studies have added substantially to our understanding of aggressive children's interactions, we need to move into children's natural environments and groups to validate and extend the conclusions drawn about the peer relations of aggressive children. With this methodology, we can observe without being present, thereby maximizing the potential to learn about children's everyday interactions.

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