Initial Dyadic Peer Interaction of Attention Deficit-Hyperactivity Disorder and Normal Boys

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The present study assessed the frequency and patterns of play duration and verbal behavior of medicated attention deficit-hyperactivity disorder (ADHD) boys in an initial social encounter with a normal, same-age peer. Eight pairs each of previously unacquainted ADHD/normal boys and normal/normal boys were videotaped as they interacted in a free-play setting ($N = 32$). The ADHD/normal dyads engaged in more solitary play and less associative play than the normal/normal dyads. Sequential analyses of the ADHD/normal dyads' play patterns revealed that they had problems in their progression along the play hierarchy, in sustaining associative play, and in avoiding withdrawal after rough and tumble play. In comparison to the normal/normal dyads, the ADHD/normal dyads also differed in the quality of verbal interaction as seen in their lower levels of verbal reciprocity and affective expression. Process explanations for the problems ADHD boys display in an initial social encounter and the implications of these difficulties for diminished socialization opportunities were discussed.

Although peer relations have been identified as playing a prominent role in the development of interpersonal skills, the establishment of social controls, and the consolidation of social values (Hartup, 1983), children

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with attention deficit-hyperactivity disorder (ADHD) appear to be at-risk for not fully benefiting from these socialization opportunities with peers. Instead, ADHD children are often rejected by their peers due to the quality of their social interaction (Milich & Landau, 1982).

The preponderance of evidence suggests that this rejection continues when ADHD children receive psychostimulant medication (Pelham & Bender, 1982) and that the peer status of medicated ADHD children is not raised to the level of normal children (Whalen et al., 1989a). Even when medication-related improvements have been reported, these changes occur in social behavior, as compared to sociometric status. In addition, the extent of change appears to vary depending on the social context in which the behavior is assessed (e.g., Cunningham, Siegel, & Offord, 1985; Whalen et al., 1987).

The theory of the reciprocal cycle (Barkley & Cunningham, 1979) postulates that medication alone is ineffective in improving the social relations of ADHD children as these children have acquired social skills deficits due to their inattentiveness to social processes. Yet social skills interventions to ameliorate the social relation difficulties of ADHD children, alone or in combination with medication, have failed to produce positive changes in peer interactions (Pelham & Bender, 1982). Putallaz and Gottman (1983) suggest that social skills training programs have been constrained by the absence of an empirical basis for selection of target behaviors.

The majority of studies that have examined the social behavior of ADHD children have been confined to simple frequency assessments. This research indicates that ADHD children, as compared to normal controls, display higher frequencies of talking (Whalen, Henker, Collins, Finck, & Dotemoto, 1979a), negative verbal and nonverbal behavior (Pelham & Bender, 1982), high rate behavior (Whalen, Henker, Collins, McAuliffe, & Vaux, 1979b), aggression (Campbell & Paulauskas, 1979), and difficulty in adapting to situational demands (Whalen et al., 1979b). While these descriptions of the difficulties ADHD children encounter in their interactions with their peers are valuable, temporal analyses are needed to understand more fully the complexity of ADHD children’s social interaction (cf. Gottman, 1983).

This temporal orientation should include an examination of the pattern of sequences in ADHD children’s social interactions. At this level of analysis, Clark and her colleagues have investigated sequential patterns of behavior among dyads containing one ADHD child and one normal child and dyads containing two normal children (Clark, Cheyne, Cunningham, & Siegel, 1988). When collapsed across a cooperative-task and a school-task situation, two behavioral sequences discriminated the ADHD/normal
dyads from the normal/normal dyads. The ADHD/normal dyads showed a greater tendency to engage in social withdrawal following aggression and showed a pattern of limited interaction characterized by less reciprocal verbal interaction than the normal/normal dyads.

While this sequential examination of ADHD children's social interactions represents a very promising advance, this type of analysis needs to be extended beyond structured settings to include a consideration of temporal variations in the antecedents, emergence, and maintenance of ADHD children's peer associations. For example, in analogue free-play settings, Pelham and Bender (1982) found that ADHD children were rejected by their peers after a second encounter, and Buhrmeister (1989) reported that rejection of ADHD children occurs within the first 6 min of interaction.

The current study investigates both the frequency and sequence of behavior among ADHD children at the beginning of their social relationships. Utilizing the peer pairing strategy of Clark et al. (1988) and Cunningham and Siegel (1987), dyads with two normal children and dyads with one normal child and one ADHD child were observed. Observations of these unacquainted children were completed in a free-play setting, as opposed to a structured setting, to increase the naturalistic quality of the social context. Two hours prior to the start of the play session, all the ADHD subjects received the dosage of methylphenidate regularly prescribed by their physician.

Although the present study was exploratory, hypotheses regarding frequency of behavior were cautiously formulated based on prior investigations of the peer relations of ADHD children. As for hypotheses about social participation, it was predicted that the ADHD/normal dyads would engage in higher rates of solitary play and lower rates of associative play than the normal/normal dyads. This hypothesis was based by Clark's finding (1988) that ADHD/normal dyads engaged in less joint activity than normal/normal dyads in cooperative and school-task analogue activities.

Hypotheses regarding verbal behavior were also constrained by the lack of research employing medicated ADHD subjects and by the limited investigation of these subjects in a free-play setting. It was predicted that the ADHD/normal dyads would engage in a higher frequency of dyadic verbalization than the normal/normal dyads. Previously, unmedicated ADHD children have been found to be more talkative than normal children in free play (Pelham & Bender, 1982) and in classroom/school-task settings (Grenell, Glass, & Katz, 1987; Whalen et al., 1979a). Finally, it was hypothesized that the verbalization of the ADHD/normal dyads would be characterized by less verbal reciprocity than would that of the normal/normal dyads. Clark and her colleagues' (1987) observations in both coopera-
tive and school-task situations support this prediction, and Cunningham et al. (1985) also report that ADHD children, as compared to normal children, are less responsive to verbal interactions.

METHOD

Subjects

Thirty-two boys between the ages of 7 and 12 were participants. Twenty-four of these boys were normal (mean age = 9.2), and these boys were recruited through pediatrician referrals, Sunday schools, soccer leagues, and library reading groups. Eight boys were selected from a hospital developmental clinic where each had previously received a physician’s diagnosis of ADHD (mean age = 8.6). At the time of diagnosis and prior to receiving psychostimulant medication, the ADHD boys had scores of 15 or higher on the Hyperactivity Index of both the parent and teacher versions of the Conners’ Behavior Checklist (Goyette, Conners, & Ulrich, 1978). When the children participated in the current study, parents of all subjects completed the Conners’ Behavior Checklist based on their observations of their medicated children. The ADHD children were found to have significantly higher hyperactivity scores than the normal children, $F(1, 30) = 62.2, p < .001, x = 18.9$ vs. 5.0.

The design of the study specified two groups of dyads; eight dyads contained pairs of unacquainted normal boys and eight dyads contained one normal boy and one ADHD boy who were unacquainted. The dyad members were matched to within 1 year of each other in age, and there were no significant differences in the boys’ ages, $p > .05$. Two hours prior to the start of the play session, all ADHD subjects received the dosage of methylphenidate regularly prescribed by their physician; these dosage levels were approximately 0.32 mg/kg with a range of 0.24 to 0.47 mg/kg.

Procedure

Each dyad spent 30 min in an analogue free-play setting, which was equipped with age- and sex-appropriate toys. They were instructed that they could play with or do whatever they wanted, and they were told that the purpose of the session was “to learn about how boys play together.” Toys that were conducive to uses indexed by each of the play duration codes were equally represented in the room. The play sessions were covertly videotaped from behind a one-way mirror.
Measures and Reliability

All tapes were coded using two coding schemes. Four undergraduate coders assessed the play duration of the dyad’s interaction with a real-time-duration coding scheme. Three other undergraduates assessed the verbal content of the dyad’s interaction in a real-time coding scheme that indexed the time of occurrence of discrete events and provided event frequency counts. Observers were blind to the assessment of reliability data, which were randomly collected throughout the coding process and which were evaluated using percentage agreement and a kappa based on a 31% overlap among the coders.

The play duration coding scheme originally consisted of 13 codes.\(^4\) Although this scheme produced an acceptable kappa of .78, the low frequency of occurrence and low percentage of agreement of some of the duration codes were of concern. Consequently, codes were lumped to produce a five-item coding system with a kappa of .83. These codes, with their percentage of agreement given in parentheses, are as follows:

1. Solitary noninteractive play — child and peer are engaged in distinctly separate play activities (or lack of activity) and are not talking (.97).
2. Solitary interactive play — child and peer are engaged in distinctly separate play activities while talking (.78).
3. Rough and tumble associative play — child is engaged in vigorous physical play activity with peer (.60).
4. Constructive associative play — while talking, child and peer are engaged jointly in a play activity that may not involve the manipulation of object(s) and that may or may not involve dramatization (.84).
5. Rule-governed associative play — child is playing a game or sport with peer. The play is goal-oriented, with winning an objective of the play (.92).

The verbal coding scheme originally consisted of 17 codes. While this coding scheme resulted in an acceptable kappa of .85, the low frequency

\(^4\)A copy of the original duration and verbal coding schemes is available from the authors.
of occurrence and low percentage of agreement of some of the verbal codes suggested that some codes should be collapsed. As a result, a nine-item coding scheme was formulated with a kappa of .86. The definitions of these codes, with percentage of agreement for each code given in parentheses, were as follows:

1. Greeting or introduction — child greets peer verbally or gesturally or may provide his/her name (1.00).
2. Activity facilitation — child makes verbal statements that are conducive to social interaction, e.g., direct request of peer to join play, expression of interest and/or positive verbalization to peer, request of assistance from peer, or attempt to redirect or get the attention of peer (.75).
3. Activity conversation-child provides or requests information about an activity (.95).
4. Personal information exchange — child provides or requests information related to school, sports, self, family, or peers (.94).
5. Negative verbalization — child teases, accuses, rebuts, or makes an unreasonable request of peer (.36).
7. Positive exclamation — child makes a positive outburst which is not directed at peer (.64).
8. Negative exclamation — child makes a negative outburst which is not directed at peer (.75).
9. Noncommunicative verbalization — child engages in noise making, singing, or guttural sounds that are not specifically for attention directing (.90).

**RESULTS**

*Play Duration*

The use of MANOVA on the proportion of time spent in each of the five duration codes was not possible due to linear dependence. Consequently, univariate analyses were conducted on each code separately, and

5The percentage agreement and kappa estimates of reliability reported for the verbal codes use the dyad as the unit of analysis. This approach provides a more conservative report of reliability as the percentage chance estimate is higher and the kappa is lower due to the increased magnitude of the marginals. When kappa is estimated for the members of the dyad individually, as is necessary for the sequential analysis of the dyad member’s verbal interactions, the reliability estimates are slightly higher.
Initial Social Interactions of ADHD Boys

Table 1. Means, Standard Deviations, and F-Values for Percentage of Duration and Frequency of Verbal Codes

<table>
<thead>
<tr>
<th>Code</th>
<th>ADHD/normal</th>
<th>Normal/normal</th>
<th>F(1, 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Duration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solitary noninteractive</td>
<td>14.3</td>
<td>34.8</td>
<td>.9</td>
</tr>
<tr>
<td>Solitary interactive</td>
<td>31.8</td>
<td>28.8</td>
<td>16.8</td>
</tr>
<tr>
<td>Rough and tumble associative</td>
<td>1.4</td>
<td>2.5</td>
<td>5.7</td>
</tr>
<tr>
<td>Constructive associative</td>
<td>36.2</td>
<td>26.1</td>
<td>45.5</td>
</tr>
<tr>
<td>Rule-governed associative</td>
<td>16.4</td>
<td>23.5</td>
<td>31.1</td>
</tr>
<tr>
<td>Verbal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Introduction</td>
<td>2.1</td>
<td>3.5</td>
<td>1.9</td>
</tr>
<tr>
<td>Activity facilitation</td>
<td>18.0</td>
<td>14.2</td>
<td>24.1</td>
</tr>
<tr>
<td>Activity conversation</td>
<td>179.5</td>
<td>83.2</td>
<td>258.0</td>
</tr>
<tr>
<td>Personal information exchange</td>
<td>44.1</td>
<td>46.5</td>
<td>24.5</td>
</tr>
<tr>
<td>Negative verbalization</td>
<td>.9</td>
<td>1.1</td>
<td>2.9</td>
</tr>
<tr>
<td>Laugh</td>
<td>20.4</td>
<td>15.9</td>
<td>41.4</td>
</tr>
<tr>
<td>Positive exclamation</td>
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<td>3.1</td>
<td>9.1</td>
</tr>
<tr>
<td>Negative exclamation</td>
<td>5.4</td>
<td>4.4</td>
<td>21.1</td>
</tr>
<tr>
<td>Noncommunicative verbalization</td>
<td>22.6</td>
<td>25.1</td>
<td>25.8</td>
</tr>
</tbody>
</table>

*p < .10

\*p < .01.

\*p < .05.

as shown in Table I, no significant differences between the ADHD/normal dyads and the normal/normal dyads were revealed.

The play duration codes were then lumped into two categories, solitary (solitary noninteractive play and solitary interactive play) and associative (rough and tumble associative play, constructive associative play, and rule-governed associative play). In this instance, MANOVA was again inappropriate and separate univariate analyses on these two proportion scores would be redundant. In both cases (i.e., the solitary or the associative category) the univariate analysis revealed significant differences between the ADHD/normal dyads and the normal/normal dyads, $F(1, 14) = 4.86$, $p < .05$. ADHD/normal dyads ($x = 46.1\%$) spent a significantly greater amount of time in solitary play than the normal/normal dyads ($x = 17.8\%$), while the normal/normal dyads ($x = 82.2\%$) spent significantly more time in associative play than the ADHD/normal dyads ($x = 53.9\%$).

Analyses were also completed to examine possible temporal variations in the frequency of duration codes across the 30-min observational period. In particular, in each of three 10-min time blocks, frequencies were calculated for the five duration codes and the two summary duration codes. Univariate analyses with the between-subjects factor of pairing
(ADHD/normal vs. normal/normal) and the repeated factor of trial revealed no significant main effects for trial or significant interactions.

Analyses were then completed to clarify the observed differences in associative and solitary play. First, it was hypothesized that the ADHD/normal pairs would take longer to attain higher levels of play activity than would the normal/normal dyads. This hypothesis was supported as univariate analysis revealed that the ADHD/normal dyads ($x = 17\ min, 21.4\ s$) had significantly longer latency to rule-governed play than the normal/normal dyads ($x = 3\ min, 7.4\ s$), $F(1, 14) = 4.04, p < .05$. Second, ANOVAs were used to compare the mean duration of the solitary and associative play episodes for each of the two groups; the hypothesis that the ADHD/normal dyads would have a significantly longer mean duration in solitary play and a significantly shorter mean duration in associative play was not supported, $p > .05$.

The next analyses were designed to assess changes in the pattern of the children’s play. At the most basic level it was hypothesized that as a result of their lack of ability to maintain associative play the ADHD/normal dyads would evidence a greater number of shifts between solitary play and associative play. Univariate analyses did not, however, reveal any differences between the two groups of dyads. Next, it was hypothesized that the maintenance of associative play was hindered by differences in the modulation of rough and tumble associative play. A chi-square test was performed to examine the type of play which followed rough and tumble associative play. Although both groups shifted from rough and tumble associative play to constructive associative play more frequently than from rough and tumble associative play to solitary interactive play (62.5% vs. 37.5% for the ADHD/normal dyads and 85.7% vs. 14.3% for the normal/normal dyads), a greater discrepancy between the two shifts was found for the normal/normal dyads as opposed to the ADHD/normal dyads, $\chi^2 = 14.02, p < .001$.

This analysis was followed by additional sequential analyses of the children’s play patterns. $Z$-score comparisons were used to examine the conditional probabilities of shifting between duration codes. The normal/normal dyads were found to be significantly more likely to shift from solitary interactive play to constructive associative play, $z = 2.60, p < .01$, and from rough and tumble associative play to constructive associative play, $z = 3.14, p < .01$, than between any other combination of the five-play-duration codes. Among the ADHD/normal dyads, no combination of the five play durations was significantly more likely to occur than any other combination.

Finally, a between-groups comparison of the conditional probabilities of shifting from one duration code to another was also performed using a $z$-score technique. The normal/normal dyads were significantly more likely
to shift from solitary interactive play to constructive associative play, \( z = 2.89, p < .01 \), and from constructive associative play to solitary interactive play, \( z = 4.09, p < .01 \), than were the ADHD/normal dyads.

The examination of within-group and between-group differences in the sequencing of play duration behaviors across three 10-min time blocks was considered. Unfortunately, there was not a sufficient number of data points in each trial to allow for this extension of the sequential analysis.

*Verbal Interaction*

Although a MANOVA revealed no significant differences between the ADHD/normal dyads and the normal/normal dyads on the nine verbal codes, \( F(9, 6) = 1.40, p > .1 \), exploratory univariate analyses were performed (see Table 1). The ADHD/normal dyads evidenced significantly fewer positive exclamations and fewer negative exclamations than the normal/normal dyads. Three codes (laugh, positive exclamation, and negative exclamation) were combined to produce a measure of affective verbalization within each dyad. Affective verbalization occurred significantly less frequently in the ADHD/normal dyads (\( x = 29.1 \)) than in the normal/normal dyads (\( x = 74.8 \)), \( F(1, 14) = 5.33, p < .05 \). The ADHD/normal dyads evidenced a level of activity conversation that was marginally lower than that of the normal/normal dyads. No univariate differences were found for any of the other verbal codes or for the summary variable of total verbalization.

Next, analyses examined possible temporal variations in the frequency of the nine verbal codes across three 10-min trials. Univariate analyses with the between-subjects factor of pairing (ADHD/normal vs. normal/normal) and the repeated factor of trial revealed significant interactions of trial and pairing for both activity facilitation, \( F(2, 28) = 4.56, p < .05 \), and activity conversation, \( F(2, 28) = 3.46, p < .05 \). Stepwise comparisons revealed that while the normal/normal and the ADHD/normal dyads did not differ in their frequency of activity facilitation across the first 20 min, the normal/normal dyads (\( x = 9.9 \)) evidenced a greater amount of activity facilitation than the ADHD/normal dyads (\( x = 4.5 \)) in the last 10 min of interaction (\( p < .05 \)). Similarly, although the normal/normal and the ADHD/normal dyads did not differ in their frequency of activity conversation across the first 10 min, the normal/normal dyads (\( x = 95.3 \) and 88.4) evidenced a greater amount of activity conversation than the ADHD/normal dyads (\( x = 59.4 \) and 53.3) in the last two 10-min trials (\( p < .05 \)).

Inasmuch as the normal/normal dyads, as compared to the ADHD/normal dyads, were engaged in more associative interaction and consequently
spent a longer period of time in a context conducive to verbalization, analyses of covariance were completed to adjust for the amount of time each dyad spent in associative interaction. Across all of the verbal measures, these covariate analyses altered only the finding for activity conversation. While previous univariate analysis revealed a marginally significant effect for normal/normal dyads engaging in more activity conversation across the 30-min observational period than ADHD/normal dyads, the covariance procedure eliminated this trend.

Similar to the duration codes, z-score comparisons of conditional probabilities were used to examine the likelihood of shifting from one verbal code to another for each of the two groups of dyads. In these analyses, the individual dyad members were considered separately. However, for the normal/normal dyads, where identification of dyad members is arbitrary, these separate response patterns were subsequently summed to obtain a single score for each dyad. Only activity conversation followed by activity conversation or followed by an absence of dialogue contained enough data points to allow the comparison of conditional probabilities (cf. Siegel, 1956).

The within-group analyses of the normal/normal dyads' verbal interactions revealed that the shift from activity conversation by one member of the dyad to activity conversation by the other member of the dyad occurred significantly more often than any other verbal shift between codes, \( z = 23.76, p < .01 \). The shift from activity conversation to an absence of dialogue did not occur significantly more often than any other verbal shift for the normal/normal dyads, \( z = 1.44, p > .05 \). This same pattern of activity conversation shifts within normal/normal dyads was evident when the 30-min observation period was broken down into three 10-min trials, all \( p < .01 \).

In comparison, within-group analyses of the verbal interactions of the ADHD/normal dyads showed three shifts between verbal codes to be more likely to occur than any other combination of shifts among the nine verbal codes: (1) activity conversation by the normal member of the dyad followed by an absence of dialogue, \( z = 2.10, p < .05 \), (2) activity conversation by the normal member of the dyad followed by activity conversation from the ADHD dyad member, \( z = 15.06, p < .01 \), and (3) activity conversation by the ADHD member of the dyad followed by activity conversation from the normal dyad member, \( z = 15.48, p < .01 \). The shift from activity conversation by the ADHD member of the dyad to an absence of dialogue from the normal partner did not occur significantly more often than any other shift between verbal codes, \( z = .76, p > .05 \).

When the 30-min observational period was broken down into three 10-min trials, the same pattern of activity conversation shifts was evident except for the first finding (all \( p < .01 \)). Instead, in each 10-min trial, the shift from activity conversation by the normal member of the dyad followed
by an absence of dialogue was not significant. Although there was the tendency for this shift to occur more frequently than other shifts in each trial, the small number of occurrences/trial provided limited power to detect differences.

A between-groups comparison of the conditional probabilities of verbal code shifts was conducted using a z-score technique. Compared to the probability within the normal/normal dyads of a shift from activity conversation to an absence of dialogue, the ADHD/normal dyads were significantly less likely to shift from activity conversation by the ADHD child to an absence of dialogue, $z = 3.35$, $p < .01$. In contrast, compared to the probability within the normal/normal dyads of a shift from activity conversation to an absence of dialogue, the ADHD/normal dyads were significantly more likely to shift from activity conversation by the normal child to an absence of dialogue, $z = 6.93$, $p < .01$. Compared to the probability within the normal/normal dyads of a shift from activity conversation by one child to activity conversation from the other child, the ADHD/normal dyads were significantly less likely to shift from activity conversation by the ADHD child to activity conversation from the normal child, $z = 103.5$, $p < .01$, and from activity conversation by the normal child to activity conversation from the ADHD child, $z = 108.8$, $p < .01$. Between-group comparisons of activity conversation shifts for the 30-min observational period broken into three 10-min blocks were considered inappropriate due to the small number of data points per trial.

**DISCUSSION**

The present investigation explored both the frequency and patterns of play activity and verbal interaction among dyads of ADHD/normal and normal/normal children. The children in the ADHD/normal dyads were found to engage in lower levels of associative interaction and were found to be less likely to return to associative play following a disruption of their associative interaction. In addition, the interactions of the children in the ADHD/normal dyads were marked by lower levels of affective expression and by less verbal reciprocity than were those of the children in the normal/normal dyads. The ADHD/normal dyads’ initial social interactions suggest the poor maintenance of a goal orientation focused on the development of acquaintanceship (Whalen et al., 1979b) and indicate that ADHD children are at greater risk for not benefiting from socialization opportunities with peers.

As predicted, the ADHD/normal dyads engaged in less associative play than the normal/normal dyads during their initial social encounters.
These results are consistent with Clark and her colleagues’ (1988) finding that ADHD/normal dyads engage in less joint activity than normal/normal dyads in cooperative and school-task analogue settings. This same pattern of lower levels of associative dyadic interaction is now extended into the context of a free-play setting where there is limited adult surveillance and where the children are not constrained by the performance demands and expectations of a structured condition.

The results of the present study, and particularly the sequential analyses, provide a detailed explanation for the differences in the quantity of associative and solitary play in this seminal social situation. First, the ADHD/normal dyads differed from the normal/normal dyads in their progression from a lower level of play to a higher level of play. The within-group analyses of the conditional probabilities of shifting from one play duration to another play duration showed the normal/normal dyads to be most likely to progress from solitary interactive play or rough and tumble associative play to constructive associative play. In contrast, the ADHD/normal dyads were no more likely to shift between one duration context than any other duration context, indicating an absence of a progression up the play hierarchy. In addition, ADHD/normal dyads, as compared to normal/normal dyads, displayed a strikingly greater latency to rule-governed associative play, the highest coded form of associative play.

Second, between-group analyses indicate that the normal/normal dyads were more likely than the ADHD/normal dyads to shift from solitary interactive play to constructive associative play and from constructive associative play to solitary interactive play. The ability of the normal/normal dyads to alternate between solitary and associative play while still spending a majority (81%) of their time in associative play is indicative of the normal children’s greater attention to the process of social interaction. The normal/normal dyads had the focus and goal orientation to be able to slip momentarily back into solitary play without actually interrupting the flow of their associative play. Potentially, a lack of goal orientation (Whalen et al., 1979b) among ADHD children may explain why the interactions of the ADHD/normal dyads contained a lower level of associative play.

Third, the ADHD/normal dyads more frequently shifted to solitary interactive play from rough and tumble associative play than did the normal/normal dyads. This finding is in direct support of Clark and her colleagues’ results (1988), which showed that ADHD/normal dyads demonstrate more social withdrawal following aggression than do normal/normal dyads in a structured task setting. The attribution of dyadic differences to either partner in the ADHD/normal dyad is an inferential exercise in the current study. Clearly, the normal boy’s response to the ADHD child may play a role in both the initiation and maintenance of social
withdrawal. Conversely, the behavior of the ADHD children may be explained by their lack of knowledge of how to handle conflict (Grenell et al., 1987) or may be due to their greater tendency to form an attributional bias of hostile intent toward their peers (Milich & Dodge, 1984). Withdrawal following rough and tumble play may also reflect a process by which the ADHD children engage in a type of self-control or perhaps protective retreat. Although this alternative explanation is speculative, the failure to consistently replicate social cognitive deficits in ADHD boys suggests that this rival hypothesis warrants further investigation. Regardless of the explanation, the withdrawal of the ADHD/normal dyads following rough and tumble associative play contributes to their low level of associative play.

The observed differences in associative play are also partly explained by differences in the quality and by temporal changes in the quantity of verbal exchange. In particular, the sequential analyses of the patterning of verbal interaction revealed less verbal reciprocity within the ADHD/normal dyads, as compared to the normal/normal dyads. This finding is in direct support of a similar, but less detailed, finding by Clark et al. (1988), who observed limited verbal reciprocity in the context of classroom and cooperative task settings. In addition, the ADHD/normal dyads, as compared to the normal/normal dyads, had lower levels of activity facilitation and activity conversation in the latter phases of their social interactions. Like the results for differences in solitary and associative play, the present findings may be particularly important, as the ADHD children appear to have a lessened opportunity to both freely engage and maintain interaction in a low-structure context and to benefit from the sharing, helping, and appropriate interaction that accompanies reciprocal verbal exchange.

Although previous researchers (Pelham & Bender, 1982; Whalen et al., 1979a; Cunningham & Siegel, 1987) have found a greater amount of total verbalization among ADHD children than among normal children, the ADHD/normal and the normal/normal dyads did not differ in their quantity of activity conversation or in their quantity of total verbalization over the entire 30 min of interaction. Instead, the current findings that demonstrate temporal changes in the quantity of activity facilitation and activity conversation suggest that differences in the amount of verbalization emerge fairly quickly in the course of acquaintanceship development, and these findings highlight the importance of the temporal examination of ADHD children's peer relations.

Several explanations can be offered for the lower levels of verbal reciprocity in the ADHD/normal dyads. First, the presence of a stranger and the task demands of successfully meeting this new child for the first time would be expected to create social anxiety (Schlenker & Leary, 1982). One speculation is that the ADHD children, who would have been less
socially successful and less experienced in similar previous social situations, might have evidenced greater social inhibition and hence a lower level of verbal reciprocity.

Second, Whalen and Henker (1985) suggest that ADHD children may be less successful at generating social scripts and as a result may be hindered in their social exchanges. This problem is magnified in unfamiliar social situations where ADHD children have been shown to experience greater difficulties mastering role and task requirements (Whalen et al., 1979b) and regulating their social communication (Landau & Milich, 1988). These difficulties with social scripts and communication help to clarify why ADHD children make a less favorable first impression than normal children (Bickett & Milich, 1987).

Third, the data outlined in this study, as well as work by Bickett and Milich (1987), suggest that ADHD children are less affectively and nonverbally expressive than normal children. The lower affective expression of the ADHD/normal dyads may be associated with psychostimulant-related dysphoria present in the ADHD partner (Whalen, Henker, & Granger, 1989b). Unfortunately, in the current study, it is not possible to measure the effect of medication on affect due to the lack of a placebo control. Another possibility is that the ADHD children may be less successful at detecting the social information in affective expression (Whalen & Hanker, 1985) and thus less reciprocally affective. In either case, this lower affective interaction may be hindering the acquaintanceship process for the ADHD/normal dyads, as affective behavior has been shown to play an important role in increasing social arousal and fostering friendship (Newcomb & Brady, 1982).

Each of these three explanations places the onus for the limitations in the ADHD/normal dyads interactions on the ADHD child. As mentioned previously, the behavior of the normal boy in these dyads may well be a critical determinant in the onset and maintenance of the dyad’s interaction. In the future, clarification of the relative contribution of each dyad member will require more complex designs along the lines proposed by Kraemer and Jacklin (1979).

ADHD subjects in the present study received the dosage level of methylphenidate currently prescribed by their physician. Previous studies of the peer relations of ADHD children have either removed the children from medication or used medication as a variable. While a medication vs. placebo design would have been preferable, the current study does provide at least some clarification of the previous equivocal findings regarding the effectiveness of medication in enhancing peer relations (c.f. Pelham & Bender, 1982; Whalen et al., 1987). In particular, while the ADHD children in the present study were receiving a dosage level previously found sufficient to enhance peer relations in a similar context (Whalen et al., 1987),
the ADHD/normal dyads were not as successful as the normal/normal dyads in their initial encounter. Clearly, this outcome might have been worse without the medication, but it appears reasonable to suggest that medication alone is not sufficient to improve peer relations to a level commensurate with normal children (Whalen et al., 1989a).

Through the study of the initial encounter in relationship formation, the results of the present investigation help explain the beginning of the cycle that leads to peer rejection for ADHD children. The assessment of this cycle requires a recognition that children's peer relationships are not static entities, but instead consist of dynamic components which include variations in the antecedents, emergence, and maintenance of social interaction. At a macro level, temporal distinctions need to be made among the initial meeting of two children, the establishment of common ground activity, the development of acquaintanceship, the resolution of conflict, and the formation of friendship. At a micro level, a different type of temporal orientation requires the examination of sequences in children's interactions at different stages of the relationship and the identification of scripted patterns of social interaction at each phase of relationship development.

The combination of both macro-temporal and micro-temporal assessment of ADHD children's initial social encounters provides a vital step toward understanding the peer rejection these children experience. Yet these results are limited as only one component in the ongoing process of relationship development is examined. Further research needs to incorporate a micro-temporal assessment of the behavior problems ADHD children confront at each stage of relationship development. These investigations will also need to consider the attenuating influence of psycho-stimulant medication. Ideally, this future research will include the three possible combinations of ADHD and normal child pairings; this type of design would then allow for the assessment of the individual contributions of each dyad member (Kraemer & Jacklin, 1979). The study of ADHD children's relationship development can then be blended with the emerging knowledge base in developmental psychology to provide a strong empirical foundation for developing clinical interventions.

REFERENCES


