Playmates and Teachers: Reciprocal and Complementary Interactions Between Siblings

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Associations between siblings’ reciprocal (i.e., play) and complementary (i.e., teaching) interactions in 70 sibling dyads (1st-born siblings’ mean age = 81.6 months, range = 59–119 months; 2nd-born siblings’ mean age = 56.1 months, range = 35–79 months) were examined. Dyads participated in 2 sessions (play, teaching) and completed a sibling relationship quality measure. Findings revealed modest associations across play and teaching sessions; for example, greater learner involvement in the teaching task was associated with more collaboration and less negative affect during play. In addition, the 2nd-born’s teaching style was related to perceptions of relationship quality. Results indicate that reciprocal and complementary types of interactions may provide important contexts for development of individual differences in dyadic and individual behaviors and may afford opportunities for siblings to influence one another’s development.

Keywords: siblings, reciprocal interaction, complementary interaction, play, teaching

Recent work in the study of individual differences in children’s relationships has used a theoretical framework based on distinctions between types of interactions (Dunn, 2002; Hinde, 1979). Sibling relationships are unique because they are characterized by both reciprocal (i.e., equal, returned exchanges typical of play and conflict) and complementary (i.e., hierarchical exchanges characteristic of teaching and caretaking) interactions. Dunn (1983) argued that reciprocal interactions are the building blocks of relationships because they afford children opportunities for developing and understanding self and others (Piaget, 1965; Sullivan, 1953). Although Dunn (1983) contended that siblings’ influence on one another is most apparent in reciprocal interactions, little work has investigated this issue or considered implications for family relationships. Thus, our purpose was to examine (a) links between reciprocal and complementary types of sibling interactions and (b) associations between interactions and siblings’ ratings of relationship quality.

Reciprocal Interactions and Sibling Relations

Siblings spend considerable time together, and as a consequence, they construct a history of shared experiences and establish close and intimate patterns of interaction (Dunn, 2002). This shared history, characterized by intensely positive, negative, and sometimes ambivalent affect, may have an important role in the patterns of individual differences evident in the frequency of pretense and sophisticated negotiations during play (Howe, Petekasos, Rinaldi, & Lefebvre, 2004), sociocognitive skills (i.e., perspective taking), and social relations (i.e., collaboration) (Lillard, 2002). These interactions require a sense of joint enterprise or a high degree of collaboration between siblings (Dunn, 1988). Therefore, we expected that highly collaborative dyads would also engage in more frequent pretense and exhibit more positive affect.

Complementary Sibling Interactions: The Case of Teaching

There are large individual differences in children’s behavior during complementary types of sibling interactions. For example, during teaching, siblings show considerable variability in their use of verbal instruction, physical demonstration, control, cognitive strategies, and degree of learner involvement in the task (Azmitia & Hesser, 1993; Koester & Johnson, 1984). First-born siblings adjust their teaching strategies according to their younger siblings’ ages by using more frequent and varied cognitive strategies when the age gap is larger (Perez-Granados & Callanan, 1997).
Further, some teachers view teaching/learning as an active, collaborative process and actively draw the learner into the task by demonstrating steps, explaining, and inviting involvement. In contrast, others view the role in a more directive, teacher-centered fashion and assign the learner to a passive and observational role. In examining individual differences, we expected that teachers who use more frequent cognitive strategies (i.e., hints) would be more likely to engage the learner, thus reflecting a learner-centered, collaborative style. Alternatively, teachers who rely on more passive methods (e.g., physical demonstrations) and who exert greater control may take less account of the learner’s abilities. A teacher-centered style may not facilitate collaborative engagement or make significant cognitive demands on either teacher or learner (Rogoff, 1998). We also investigated birth-order influences on children’s teaching and expected first-born teachers to use more controlling methods than do second-born teachers, because of greater familiarity with assuming the dominant role in sibling interactions. In addition, we expected that older teachers (independent of birth order) would use more sophisticated teaching methods, perhaps because of more advanced socio-cognitive abilities.

The Role of Sibling Relationship Quality

Another way to conceptualize developmental influence is to investigate how sibling relationship quality may be related to patterns of sibling exchanges (Dunn, 1996). Siblings’ positive and negative reciprocal interactions are associated with their perceptions of relationship quality (Dunn, 2002), and first-borns reporting greater conflict engage in less structuring and positive guidance during teaching (Poris & Volling, 2001). Thus, relationship quality may differentially influence siblings’ play and teaching styles, or vice versa. When dyads perceive their relationship positively, siblings may be more likely to engage in friendly play interactions and encourage active learner involvement and use less control during teaching. Perceptions of relationship quality may be differentially related to the behavior of first- and second-born sibling teachers. For instance, relationship quality may have a greater impact on second-borns’ teaching style, as first-borns may be more willing to relinquish power when their relationship with their sibling is positive rather than negative.

Links Between Reciprocal and Complementary Sibling Interactions

Little work has examined links between reciprocal and complementary types of interactions, yet examining how individual differences in dyadic reciprocal play styles are related to individual teaching behaviors may illuminate researchers’ understanding of relationship dynamics and may provide insight into family functioning. Two types of associations form the basis of our questions. First, during play, two children must coordinate their perspectives, use negotiation strategies, and engage in a high degree of collaboration so as to expand their joint play (Lillard, 2002), but associations with teaching strategies are unexplored. We propose that if sibling dyads engage in frequent collaboration and social pretense, teachers will be likely to use cognitive strategies to promote learner success in the task. Second, varying degrees of positive and negative affect are evident during sibling play (Dunn, 2002), but associations with teaching styles and learner involvement have not been examined. When play is characterized by shared positive affect, we may expect a more active approach to teaching and learning. In contrast, when dyads are more negative during play, the teacher may restrict the learner’s involvement and engage in greater control. The role of teacher birth order was also investigated as a moderator of associations between play and teaching behaviors.

Method

Participants

Participants included 70 middle-class sibling dyads (first-born mean age = 81.6 months, range = 59–119 months; second-born mean age = 56.1 months, range = 35–79 months) that were balanced for gender (20 female–female, 15 male–male, 20 female–male, 15 male–female pairs). Families were recruited from day care facilities and kindergartens and by word of mouth. Each dyad participated in two videotaped counterbalanced sessions (play = 10–15 min.; teaching = 5–10 min.) at home, and both children were individually interviewed about their sibling relationship.

Play Sessions

Siblings were given a wooden farm set (large and small barn animals, figures, fences, trees) designed to promote pretend play. The following behaviors were rated on a scale ranging from 1 (none) to 5 (extended evidence) during each 30-s interval: (a) pretend play (i.e., speech, actions indicating pretense), (b) collaboration (i.e., degree of connection indicating cooperation), (c) positive affect (i.e., statements/behaviors denoting friendliness), and (d) negative affect (i.e., statements/behaviors denoting conflict, negative emotions). Ratings were averaged across intervals to produce one score per variable for each dyad. Interrater reliability was calculated with the Spearman-Brown formula on 15/70 (21%) dyads: pretend play (r = .96), collaboration (r = .93), positive affect (r = .89), and negative affect (r = .86).

Teaching Sessions

Half of first-born siblings and half of second-born siblings were assigned in counterbalanced order to be the teacher. A research assistant privately instructed the teacher regarding how to construct a tractor with a plastic construction toy (Lasy Co., Germany), which consisted of 20 pieces whose function and manner of assembly were not immediately apparent without prior instruction. After teachers demonstrated competence by independently constructing the tractor, they taught their sibling. The following behaviors were rated on a scale ranging from 1 (none) to 5 (extended evidence) during each 30-s interval (based, in part, on Azmitia & Hesser, 1993; Rogoff, 1998): (a) verbal instruction (i.e., saying

1 This coding scheme was based in part on Stocker, Dunn, and Plomin’s (1989) research. All coding manuals are available from Nina Howe.
how to build), (b) physical demonstrations (i.e., showing steps), (c) learner involvement (i.e., degree of engagement), (d) control (i.e., telling learner what to do), and (e) cognitive strategies (i.e., providing hints). Ratings were averaged across intervals to produce one score per variable for each session. The Spearman-Brown formula was used for interrater reliability on 14/70 (20%) of dyads: verbal instruction ($r = .96$), physical demonstrations ($r = .98$), learner involvement ($r = .93$), control ($r = .92$), and cognitive strategies ($r = .91$).

**Sibling Relationship Quality**

Both siblings were individually, privately interviewed in a counterbalanced order with a 19-item version of the Sibling Behavior and Feelings Questionnaire (Mendelson, Aboud, & Lanthier, 1994). Items pertained to children’s perceptions of support, companionship, closeness, positive feelings, and conflict. Children responded by pointing to one of three circles of graduated size (1 = not very often, 2 = sometimes, 3 = very often). Cronbach alphas measured internal consistency (.85 and .86 for first- and second-born siblings, respectively).

**Results**

Preliminary analyses failed to reveal any significant individual or dyadic gender effects. Because gender was not of central concern in this study, it was not examined further.

**Siblings’ Dyadic Behavior in a Play Context**

Descriptive statistics for children’s dyadic play behaviors are reported in Table 1. Because play ratings encapsulated the behavior of both children in the dyad, birth order effects could not be assessed. Therefore, we examined the effect of the mean age of both children (dyad age), which was related to positive affect, $r = .42$ (both $ps < .001$), and collaboration, $r = .44$, but not to negative affect or pretend play. Partial correlations (controlling for dyad age) computed between the play behaviors indicated that positive affect was negatively associated with negative affect, $pr = -.29$, $p = .01$, and positively related to collaboration, $pr = .70$, $p < .001$. In turn, dyads exhibiting greater negative affect were less likely to collaborate, $pr = -.33$, $p < .01$. Pretend play was not significantly associated with any play behaviors, $prs < .19$.

**Siblings’ Behavior in a Teaching Context**

Descriptive statistics for teacher behavior (by teacher birth order) are reported in Table 1. Given the verbal nature of some teaching codes, the overall number of teacher speech clauses (one subject–verb group per clause) was controlled in all analyses.

**Age and birth-order effects on teaching behavior.**

Teaching behaviors referred to the cognitive strategies of one child; thus, we examined both age and birth-order effects. Teacher age was related to birth order, $r = .68$, $p < .001$. To differentiate between these two effects, partial correlations between teacher age and teaching behaviors were computed (birth order and teacher speech clauses controlled). Teacher age was related to verbal instruction, $pr = .34$ (all $ps < .01$), learner involvement, $pr = .44$, control, $pr = .35$, and cognitive strategies, $r = .40$, but not to physical demonstrations. A series of analyses of covariance (ANCOVAs) examined the effect of birth order (with teacher age and speech clauses covaried) on teaching behavior, and only learner involvement was significant, $F(1, 66) = 15.75$, $p < .001$; second-born teachers were more likely to involve the learner than were first-born teachers (adjusted $Ms = 3.26$ and 2.19, respectively).

**Associations between ratings of teacher behavior.** Partial correlations (with teacher age and speech clauses controlled) were computed among the five teaching behaviors (see Table 2). Verbal instruction was positively associated with physical demonstrations, control, and cognitive strategies, whereas physical demonstrations were negatively related to learner involvement and positively related to cognitive strategies. Use of cognitive strategies was positively associated with both learner involvement and control. Note that associations between verbal instruction and learner involvement and between physical demonstrations and control approached significance. A series of multiple regressions assessed whether teacher birth order moderated these associations. Teacher age and number of speech clauses were entered in the first step, followed by teacher behavior and birth order in the second step and the Teacher Behavior $\times$ Birth Order interaction in the third step. We report only significant results from the third step (i.e., a significant $R^2$ change from the second step to the third step). First, teacher birth order significantly moderated the association between physical demonstrations and control, $R^2$ change $= .087$, $p < .01$. Partial correlations (teacher age and speech clauses controlled) revealed a positive association between physical demonstrations and control for second-born teachers, $pr = .58$, $p < .001$, but not for first-born teachers ($pr = -.17$, $ns$). Second, birth order moderated the association

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2 Conflict items were reverse coded.

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**Table 1**

**Mean (SD) Ratings of Siblings’ Dyadic Play and Individual Teaching Behaviors**

<table>
<thead>
<tr>
<th>Behavior</th>
<th>Dyadic play</th>
<th>Individual teaching</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>First-born</td>
<td>Second-born</td>
</tr>
<tr>
<td>Positive affect</td>
<td>1.65 (0.53)</td>
<td>1.89 (0.52)</td>
</tr>
<tr>
<td>Negative affect</td>
<td>1.26 (0.28)</td>
<td>1.88 (0.62)</td>
</tr>
<tr>
<td>Collaboration</td>
<td>1.68 (0.54)</td>
<td>1.93 (0.70)</td>
</tr>
<tr>
<td>Pretense</td>
<td>1.39 (0.39)</td>
<td>1.53 (0.54)</td>
</tr>
</tbody>
</table>

**Note.** For all behaviors, ratings ranged from 1 to 5.
between physical demonstrations and cognitive strategies, \( R^2 \text{ change} = .068, p = .01 \). Partial correlations revealed a similar pattern, namely, a positive association between physical demonstrations and cognitive strategies for second-born teachers, \( pr = .54, p = .001 \), but not for first-born teachers, \( pr = -.03, ns \).

**Relationships Between Play and Teaching Behavior**

Partial correlations (controlling for speech clauses, dyad age, and teacher age) assessed relationships between play and teaching behaviors. Teachers who used verbal instruction were more likely to be from a dyad exhibiting greater positive affect during play, \( pr = .25, p < .05 \). In addition, teachers facilitating greater learner involvement were from dyads that engaged in more collaboration, \( pr = .28, p = .02 \), and less negative affect, \( pr = -.27, p = .03 \). The negative relationship between physical demonstrations and dyadic pretense levels also approached significance, \( pr = -.23, p = .06 \). A series of multiple regressions examining the moderational effect of teacher birth order on associations between individual teaching and dyadic play behaviors failed to reveal significant Birth Order \( \times \) Teaching Behavior interactions.

**Sibling Relationship Quality, Play, and Teaching**

Several children were missing responses to items on the sibling relationship questionnaire. When less than 25% of the data were missing (i.e., for 6 first-borns and 6 second-borns), overall scores were proportionalized to produce a value on the same scale as that for participants with complete data. Five second-borns missing more than 25% of items were dropped. Scores could range from 19 to 57, with higher scores indicating more positive relationships; first- and second-borns’ mean relationship quality ratings were 45.02 (\( SD = 7.57 \)) and 45.93 (\( SD = 6.68 \)), respectively. Siblings’ ratings were only modestly related, \( r = .27, p = .03 \); thus, correlations between these scores and play and teaching were examined separately.

**Relationship quality and teaching behaviors.** Partial correlations (controlling for dyad age and teacher age) indicated that only the association between the first-born child’s perceptions of relationship quality and teacher control approached significance, \( r = -.28, p = .07 \). A series of multiple regressions assessed whether teacher birth order moderated the relationship between teaching behavior and relationship quality. For each analysis, dyad age and teacher age were entered in the first step, followed by the main effects of birth order and teaching behavior in the second step and the interaction term in the third step. The only significant moderational effect of birth order was on the association between control and the first-born sibling’s rating of relationship quality, \( R^2 \text{ change} = .056, p < .05 \). When the second-born child was teaching, the first-born’s assessment of relationship quality was negatively related to control, \( pr = -.45, p = .01 \), but the association was nonsignificant when the first-born sibling was teaching, \( pr = -.07, ns \).

**Relationship quality and play behaviors.** Neither the first- nor second-born child’s perceptions of the relationship were significantly correlated with any of the play behaviors.

### Discussion

**The Nature of Reciprocal Play Interactions**

The play behaviors were interrelated and indicated that dyads, particularly older dyads, whose interactions were marked by friendly exchanges were more likely to collaborate, whereas negative affect and collaboration were negatively associated. These findings support the literature (Dunn, 1988). Further, positive and negative affect were weakly negatively associated, suggesting that they measured separate but related dimensions. Individual differences in friendly interactions may be associated with children’s ability to create shared meanings in their relationship, which in turn may be related to the quality of family functioning. That is, more harmonious sibling relationships may reflect children’s social understanding skills, which should be of benefit in contributing to better family functioning or vice versa. Finally, pretense ratings were not linked to collaboration, perhaps because methodological challenges (noted below).

**The Nature of Complementary Teaching Interactions**

Different approaches to teaching were illustrated by the patterns of interrelationships among variables, which were also moderated by teacher age and birth-order effects. In particular, older teachers were more likely to engage in verbal instruction, cognitive strategies, and control and to
engage the learner in the task, which may reflect greater sociocognitive skills, verbal ability, and experience. Cognitive strategies may indicate that these teachers were scaffolding and, thus, drawing the learner into the task (Rogoff, 1998). Yet, use of cognitive strategies was also associated with verbal instruction and other directive teaching (i.e., physical demonstrations, control). These findings were moderated by birth-order effects, namely, only for second-born teachers, positive associations were evident between physical demonstrations and control and between physical demonstrations and cognitive strategies. Given second-born teachers’ less advanced verbal skills, physical demonstrations may be an effective device for structuring the task and for engaging first-born learners. In contrast, first-born teachers may be less likely to rely on nonverbal approaches, but future work is needed to examine this finding in greater depth. Not surprisingly, given their relative unfamiliarity with a teaching role and their assumption of the older sibling’s competence, second-born teachers were also more likely to involve the first-born learner than vice versa. Given the participants’ ages, placing the second-born sibling in a teaching role likely disrupted the usual balance of power in the relationship. As such, first-born learners may have also been eager to involve themselves in the task.

The global nature of our rating scales did not address the specific cognitive strategies used. A more detailed sequential analysis may illuminate why using cognitive strategies was paradoxically related both to a directive style and to facilitating learner involvement. When children view teaching as an active process that takes account of the learner’s skills, significant cognitive demands are placed on both participants (Rogoff, 1998). Thus, future research should elucidate the role of sociocognitive skills (a) in different teaching approaches, (b) in the learner’s ultimate success at the task, and (c) in associations with other developmental outcomes related to family well-being (e.g., conflict negotiation strategies).

**Links Between Reciprocal and Complementary Interactions**

Associations between dyadic play interactions and individual teacher behaviors were modest but suggest some interesting patterns. Greater collaboration during play was positively associated with greater learner involvement during teaching, and as predicted, negative affect and learner involvement were negatively associated. When play interactions were positive, teachers were more likely to use verbal instruction. Thus, individual differences in affective intensity and collaboration during play were associated with varying degrees of learner involvement during teaching. Collaboration during play speaks to the notion that children co-construct shared meanings about their play through a history of friendly joint experiences (Dunn, 2002). This dyadic interaction style was associated with a teaching style that afforded opportunities for collaboration or active engagement by both teacher and learner (Rogoff, 1998). If we speculate that collaboration skills may reflect children’s sociocognitive abilities, then perhaps siblings who demonstrate greater abilities during play may use these skills in a learner-centered teaching style. However, further work is required, considering the lack of support for the predicted association between pretense and teachers’ cognitive strategies. Although other variables (e.g., temperament, personality) may also be important, the individual differences revealed have implications for understanding how siblings influence one another’s development. These data imply that parents should help siblings develop positive, collaborative behaviors across a range of contexts (e.g., play, teaching), which may include learning to manage conflict constructively (Kramer, Perozynski, & Chung, 1999). In addition, interventions aimed at promoting positive sibling interactions may also be associated with more effective teaching.

**Conclusions**

The study’s limitations include the middle-class sample that reduces generalizability, lack of a direct sociocognitive measure, use of ratings, and self-report measures of relationship quality. These measures present methodological challenges because they do not allow for a refined examination of the processes of play, teaching, and the specific domains underlying relationship quality. Although we did not directly test Dunn’s argument that reciprocal rather than complementary interactions may be more influential in children’s development, our findings raise some interesting questions. We add to the current literature by revealing some links between reciprocal and complementary types of interactions. Following from this preliminary evidence, play and teaching may be important contexts because they afford opportunities for children to develop skills necessary for both individual and dyadic types of interaction. Future work should examine how siblings’ influence on one another may be linked to developmental outcomes and family well-being; in particular, a detailed examination of the moderating role of relationship quality is warranted. Nevertheless, we might expect that siblings who demonstrate skills in collaboration, use cognitive strategies, and are actively engaged in friendly ways might contribute positively to healthy family dynamics. Such a pattern of interaction suggests that children understand others’ points of view, which may facilitate harmonious family interactions and flexible conflict resolution. In conclusion, the present study indicates that the conceptual framework for studying relationships as set out by Dunn (1983, 2002) and Hinde (1979) continues to provide important insights and direction for those in the field.

**References**


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**New Editor Appointed, 2007–2012**

The Publications and Communications (P&C) Board of the American Psychological Association announces the appointment of a new editor for a 6-year term beginning in 2007. As of January 1, 2006, manuscripts should be directed as follows:

- *Emotion* (www.apa.org/journals/emo.html), Elizabeth A. Phelps, PhD, Department of Psychology, New York University, 6 Washington Place, Room 863, New York, NY 10003.

**Electronic manuscript submission.** As of January 1, 2006, manuscripts should be submitted electronically via the journal’s Manuscript Submission Portal (see the Web site listed above). Authors who are unable to do so should correspond with the editor’s office about alternatives.

Manuscript submission patterns make the precise date of completion of the 2006 volumes uncertain. The current editors, Richard J. Davidson, PhD, and Klaus R. Scherer, PhD, will receive and consider manuscripts through December 31, 2005. Should 2006 volumes be completed before that date, manuscripts will be redirected to the new editor for consideration in 2007 volume.