# On Winning Some and Losing Some:
# A Social Relations Approach
# to Social Dominance in Toddlers

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Predictors of social dominance and the effects of social dominance on the play behavior of young children ($N = 16$, ages 1.4 to 3.2) were studied. The children were observed in multiple interactions ($N = 74$) with multiple partners to explore individual-level effects and effects due to individual–partner interactions (i.e., a social relations approach). Social dominance was expected to mediate individual-level attributes and social behavior and the mediation was expected to be moderated by the degree of familiarity between individuals. Multiple-group path analyses of the mean and covariance relations broadly supported these hypotheses. These findings have both developmental and evolutionary implications, especially in light of the age of the participants.

The inevitable struggles of early social interactions (e.g., disputes over toys) expose a child to a seemingly endless string of wins and losses. For the most part, concern for the child is tempered by the old adage, "you win some, you lose some," a valuable if not harsh lesson. But what about the child who wins few and loses most, or even wins none and loses all? The win–loss experiences of a young child in the peer group are not distributed randomly. If children are ordered according to their wins and losses over objects or agonistic encounters (i.e., by who prevails over whom), a social dominance hierarchy results (McGrew, 1972; Russon & Waite, 1991; Sluckin & Smith, 1977; Strayer & Strayer, 1976). In this

study we examined the predictors of a child's standing within the social dominance hierarchy, and in turn the effects of dominance asymmetries on the social behavior of young toddlers, ages 1 to 3, during dyadic semistructured play interactions.

In the following, the metatheoretical (evolutionary) underpinnings of social dominance and an expanded theoretical (social relations) perspective of social dominance are described. Both viewpoints cast inequity squarely within the context of interpersonal relationships and provide a foundation for the hypothesized model that is presented and tested. Specifically, we explore (a) the role of individual-level characteristics in predicting an individual's standing in a stable social group and (b) the influence that this dominance standing has on the course of social interactions outside the context of strict competition. In so doing, we elaborate on the traditional ethological approach by focussing not only on within-group behavior patterns, but also on psychological qualities of the individuals and the effects that inequitable outcomes of competition may have on toddlers' interactions.

## Evolutionary Underpinnings of Social Dominance

Human behavior has evolved in the context of the social group (Alexander, 1979; Cosmides & Tooby, 1987; Trivers, 1971). Despite the clear advantages of living and coordinating with others, within-group competition is commonplace given that resources are limited. Based on an individual-level selection rationale (Dawkins, 1989; Williams, 1966), the ability to judge accurately one's own relative ability to compete with other group members and to behave prudently has a sizable selective advantage over fight-at-all-costs strategies that lead to reckless energy expenditures and risks of injury (Maynard Smith, 1974; Tinbergen, 1953). As a consequence, individuals within social groups have evolved to behave in ways that promote personal resource acquisition, and at the same time minimize interpersonal conflict. From this evolutionary perspective, the adaptive rule of thumb would be, assert when you can prevail, yield when you cannot.

## A Social Relations Approach to Social Dominance

Because individuals vary in their ability to compete within the group, pairwise comparisons among individuals yield differentials in competitive ability or motivation to compete for resources. Social dominance describes these manifest asymmetries and dominance hierarchies summarize these dominance relations (Bernstein, 1981; Hawley, 1999;

Strayer & Strayer, 1976). In this respect, social dominance is a funda-
mental aspect of relationships and individuals' adaptive negotiation of
these relationships should be manifested at a very early age. From a
psychological standpoint, if social dominance is a valid independent
variable in its own right, rank asymmetries should influence social be-
havior in nonconflict situations. In other words, children should demon-
strate behaviorally that dominance asymmetry is a meaningful aspect of
their relationships.

Relationships of this type are possible when individuals recognize
each other, interact periodically over an extended period of time, and
can remember the results of past encounters (Hinde & Stevenson-Hinde,
1976). With experience individuals come to some mutual "under-
standing" and behave within the constraints unique to each relationship
(Bernstein, 1981; Hinde & Stevenson-Hinde, 1976). Accordingly, inter-
acting children in such relationships may eventually come to be friends
or to actively avoid each other.

The evolutionary underpinnings of and the social relations approach
to social dominance are fully compatible because they both assume that
behavior is flexible and partner specific. Both perspectives predict that
individuals change their behavior according to the relative rank of their
social partners. Partner-specific win–loss histories (and salient morpho-
logical cues) should inform one when one can and cannot prevail. The
more win–loss experiences two children have with each other, the more
this win–loss history will affect their social behavior in a noncompetitive
context because they have formed internalized representations of their
relationship, including its boundaries and constraints. As a result, overt
aggression between partners should decrease in subsequent interactions
(Tinbergen, 1953). This context specificity allows even an individual of
low status to be dominant, so long as his or her partner is of lesser rank.

## The Ethological Approach to Social Dominance

Much of what is known about social dominance stems from ethol-
ogy. An ethological approach is characteristically evolutionary in orien-
tation and views social dominance as a basic, salient, and observable
dimension of social organization (Omark, Strayer, & Freedman, 1980).
Dominance hierarchies are generally derived from outcomes of aggres-
sive interactions and disputes between children in free-play situations
(i.e., wins and losses; Sluckin & Smith, 1977; Strayer & Strayer, 1976).
One of the most important goals of child ethologists has been to explore
the effects of dominance hierarchies on the social behavior of the group

as a whole and outside of the context of conflict. Dominant preschoolers, for example, tend to be preferred social models, attractive play partners, and the targets of their peers' gazes (Abramovitch & Grusec, 1978; LaFreniere & Charlesworth, 1983; Russon & Waite, 1991; Vaughn & Waters, 1981). A common characteristic of this work, however, has been the focus on the structure of the group; relationships are collapsed and then one ordinal scale (e.g., dominance hierarchy) is correlated with another (e.g., social attention). From our social relations viewpoint, this approach says very little about how individuals direct these behaviors in the context of their relationships (Archer, 1992). How does a child of middle rank distribute his or her attention and imitation across members of the group? From a social relations perspective, we would expect this child to watch and imitate those of higher rank and be watched and be imitated by those of lower rank.

Another question posed by ethologists has been, what predicts a child's ability to be dominant relative to his or her peers? This work suggests that attributes associated with physical strength, gender, and physical attractiveness are associated with dominance rank in ages ranging from childhood through adolescence (e.g., McGrew, 1972; Savin-Williams, 1976; Weisfeld, Bloch, & Ivers, 1984; Weisfeld, Omark, & Cronin, 1980), as are more subtle physical cues such as posture (Weisfeld & Beresford, 1982) and facial gestures (Keating & Bai, 1986).

Fewer researchers have examined social dominance in terms of less visible psychological attributes (Weisfeld, Bloch, & Ivers, 1983). Attributes that may not be immediately detectable by an observer may be related to competitive ability and, equally important, to motivation to compete. Such variables are especially important when casting dominance in terms of win–loss histories. Differences in physical strength are readily apparent but only experience will reveal how motivated and determined the opponent is. In the current study, we extend the exploration of predictors of social dominance by incorporating intelligence (Stogdill, 1974), goal directedness (as reflected in temperamental persistence; Angleitner & Ostendorf, 1994), and experience with the social and physical environment (Bernstein, 1980).

## Overview of the Study

Because we couch social dominance expressly in terms of interpersonal relationships and the contributions of individuals to such relationships, we applied a dyadic interaction paradigm (Ickes & Tooke, 1988; Kenny & LaVoie, 1984). Specifically, 16 children were tested in a multi-

ple-partner round-robin design, where the goal is to pair every child with most or all potential social partners. This design has three primary advantages for this study. First, children are observed with multiple partners, even those with whom they may not normally interact (e.g., avoidant relationships). Second, analytic techniques can effectively disentangle the data according to the characteristics of the two interactants and their unique relationship (i.e., the social relations model; Gonzalez & Griffin, 1997; Kenny & LaVoie, 1984). Here, the focus of inquiry shifts from the 16 children to the 120 (i.e., $(16 \times 15)/2$) potential interpersonal relationships among them. Third, the controlled pairing of individuals provides behavioral observations that are more concentrated and informative than less controlled methods. That is, individuals are compelled to interact (or not interact) meaningfully immediately upon encountering each other. Thus, ample information can be extracted even from a relatively short observation period (e.g., 5 min).

A major hypothesis of this study is that social dominance is a salient feature of interpersonal relationships in toddlerhood that is predicted by individual-level attributes. In addition, we expected a child's relative competitive ability (i.e., dominance rank) to mediate the relations between the individual-level attributes and a child's behavior in play interactions. This mediation hypothesis applies to those children who know each other well, and not for less-well-acquainted children (i.e., moderated by familiarity). Thus, the following hypotheses are tested.

*Individual-level effects.* Given that relative competitive ability is influenced not only by physical attributes, we expected measures reflecting developmental maturity, persistence, and experience with a peer group (contextual experience) to predict social dominance.

*Relational-level effects.* Given that children should adapt their behavior according to the relative social dominance rank of their partners, we expected the relational characteristics (e.g., differences in rank) to uniquely predict the dyadic behavior of toddlers above and beyond individual-level characteristics.

*The moderating role of familiarity.* Given that social dominance is an aspect of a relationship and that young children come to learn the parameters of their relationships over multiple encounters, we expected dominance to exert a differential effect according to the degree to which two children are familiar with each other. Specifically, we compare two categories of dyads that vary on degree of familiarity (i.e., very familiar and acquainted). Familiarity should moderate the effects of social dominance in such a manner that they are more pronounced in established relationships than in acquainted relationships.

## METHOD

*Participants*

Sixteen children (ages 1.4 to 3.2 years; $M = 2.5$; 7 girls, 9 boys) enrolled in the Max Planck Institute-affiliated daycare facility participated in the study. Although the daycare center is associated with the Max Planck Society, it serves the local middle-class Berlin community. Two families were associated with the Institute. Each child had at least one German parent. More than half of the mothers and fathers had at least some advanced training (American and German systems of education are not directly comparable). The girls ($M = 2.35$ years, $SD = 0.60$) were slightly younger than the boys ($M = 2.67$ years, $SD = 0.31$), but not significantly so ($p = .20$).

*Care Groups*

Children are admitted to the daycare center primarily in the fall and are assigned to one of two care groups of eight children each. Each group has its own room and caretaker. Although the two groups mingle daily, the children spend most of their time with their own group in their own playroom where they experience two structured meals together, organized activities, and a nap. This built-in structure of the daycare gave rise to the familiarity variable (see later). At the time of this study, all children had been in the nursery for at least 5 months and during this time there were no cross-care group transfers. The care groups did not differ in age composition (Group 1: $M = 2.41$ years, $SD = 0.52$; Group 2: $M = 2.65$ years, $SD = 0.42$; $p = .33$).

*Testing Procedures*

*Dyad selection.* Behavioral outcomes were observed in the context of a quasi-experimental design involving observations of multiple dyadic semistructured play encounters. A total of 74 of the 120 possible dyads were observed within an 8-week period (May–July, 1995) in one of two playrooms (on alternating days) between 10:30 A.M. and 12:00 P.M. In this study, a purely randomized selection process was unworkable from the outset. First, dyads are selected without replacement in round-robin designs (Kenny, 1990). Thus, selection possibilities became more constrained as the study progressed. Second, participation was completely voluntary and selection depended on who was available and willing. Holiday activities of some of the families and weather affected both availability and willingness. For example, on warm days children pre-

ferred highly attractive outdoor group activities. Because these irregularities were dispersed more or less randomly, however, and we have no evidence of any systematic effects associated with holiday or weather, we believe that the dyad pairings are unbiased. From a sampling point of view, both the number (62% of the possible pairings) and the nature of the dyads selected appears to be representative of this group of toddlers. Moreover, each child was observed nine times on average.

*Test situation.* Interactions were filmed from behind a one-way glass screen and recorded from microphones that were mounted above the children's heads. On test days (two or three times a week), two children were taken to a playroom equipped with toddler-sized table and chairs and novel play material. The male tester briefly explained and demonstrated the play material, encouraged the children to play together, and left the room. After 5 min of filmed interactions, the children returned to their care groups.

Although 5 min appears brief at first glance, it was adopted as an adequate time interval for three reasons. First, the design provided for a very productive 5 min that is more informative than equal or longer periods in less controlled designs (e.g., free-play observation). Second, some children had difficulty engaging in a table-bound activity with a single peer for much longer than 5 min. That is, 5 min seemed to be a reasonable upper bound that even the youngest children could achieve. Third, most of the constructs are represented by multiple indicators. Therefore, both the reliability and validity of the observational information is explicitly addressed in our analyses (see later). Moreover, the adequacy of the 5-min intervals is borne out in the outcomes of the analyses: Any unreliability of observations would result in inadequate power that would make rejecting our guiding hypotheses more difficult (i.e., increase the probability of Type II error; Epstein, 1980).

*Test material.* Across the dyadic interactions, multiple sets of play materials were presented so that each child encountered each activity at most two times. This counterbalancing ensured that the activities and play situation remained novel and attractive, and circumvented systematic variation due to activity by dyad interaction. The activities were selected to elicit a wide range of natural behavior patterns. The children were not constrained in the way they used the play materials nor were they required to interact with the materials or their partner. Play material was selected (a) to have multiple parts so that each child could be engaged if so desired (i.e., play materials were not strictly limited), and (b) to have a central attractive component that presumably would draw the attention of both participants and stimulate social intercourse (see

**Table 1.** Overview of the Six Dyadic Activities

| Sample activity | Central attractive component | Multiple parts |
|---|---|---|
| Large fold-out street map | Car | Family and animal figures |
| Stringing beads | String | Colored wooden beads |
| Tools | Workbench | Screwdriver, screws, etc. |
| Store | Cash register | Toy fruits and vegetables |
| Farm puzzle | Puzzle base | Animal pieces |
| "Stack-man" [a] | Stacking base | Colored cut-outs |

[a] The object is to balance or hang as many person-like cut-outs on the central base.

Table 1). Although some of the test material was not optimally sex neutral (e.g., cars, beads), additional analyses showed that boys and girls engaged equally with the toys and there was no significant gender by activity interaction.

## Measures and Variables Used in the Analyses

Four types of variables across the 74 dyadic interactions were analyzed; a moderator variable (degree of familiarity), a mediator variable (social dominance rank), four predictors (individual-level attributes), and five outcome variables (nonconflict dyadic behavior).

*Degree of familiarity.* To test the moderating effect of familiarity, dyads composed of children drawn from the *same* care group were classified as *established relationships* ($n = 36$) and dyads composed of children drawn from *different* care groups were classified as *acquainted relationships* ($n = 38$). The established relationships did not differ from acquainted relationships in age composition (established: $M = 2.61$ years, $SD = 0.37$; acquainted: $M = 2.67$ years, $SD = 0.30$; $p = .37$). Again, all children regardless of group membership had encountered each other daily for at least 5 months. However, we hypothesize that individuals in within-group relationships share more experiences overall than do individuals in cross-group relationships and these differential histories moderate the mediation effect of dominance.

*Dominance rank.* At the onset of data collection, the two caretakers ranked each child within their own care group according to who prevailed in conflicts and disputes (i.e., win–loss histories), resulting in two separate ordinal-scale hierarchies, one for each of the two care groups. These within-group rankings were corroborated through free-play filming of the children within their respective care groups. Although con-

flicts occurred relatively infrequently in this context, the observed dominance relations showed 96% agreement with the caretaker's rankings.[1]

*Individual-level attributes.* To evaluate interaction patterns in terms of the participants' attributes, individual-level attribute scores were calculated for each participant on each day that s/he was observed. Thus, except for a child's gender, the individual-level measures have ever-changing values for each day of observation.

Mental age was measured by the Bayley Scales of Infant Development (Version II, Psychological Corporation, 1993), which were administered repeatedly for each child at 18, 24, 30, and 36 months of age. The girls did not differ significantly from the boys in developmental age (girls: $M = 2.44$ years, $SD = 0.67$; boys: $M = 2.54$ years; $SD = 0.65$; $p = .65$). Similarly, as an index of physical maturity, a child's size (height and weight) was measured every 3 months. Given the high colinearity among these measures, with respective $r$s of .71, .59, and .87, each child's size, chronological age (in days), and mental age were averaged to create a broad index of developmental maturity ($r_{xx} = .89$).

The length of time (in days) each child was enrolled in the daycare facility was used as an index of experience (range 150–714 days). This variable is referred to as *tenure*. Each child's gender was included also as a broad reflection of various gender-related influences such as aggression (Maccoby & Jacklin, 1980). For these variables, accurate measurement reliability was assumed.

Temperament was measured every 3 months by the parents of each child using the Toddler Temperament Scale (Fullard, McDevitt, & Carey, 1984; abbreviated German version, Saile, 1987). One of nine factors expected to be relevant to social dominance was used, namely, persistence (i.e., as an indicator of goal directedness and motivation; Angleitner & Ostendorf, 1994; Savin-Williams, Small, & Zeldin, 1981). The estimated reliability of this measure is .80 (Fullard et al., 1984).

*Nonconflict dyadic behavior.* To code the dyadic behavioral interactions, each 5-min interaction segment was divided into 30 10-s intervals (Rhine & Linville, 1980). All behavior for each child was coded into over 30 categories. Occasion-level intercoder agreement (McGrew, 1972) was above 90% (κs ranged from .73 to 1.0, with an average of .88; Gottman & Roy, 1990), and any disagreements were resolved via team discussion. Continuous variables were created by calculating the

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[1] Within each care group there are 28 possible dyads (i.e., (8 × 7)/2) or 56 total over two groups. Of these 56 dyads, 24 showed one or more conflict-based interactions. Of these, one was contrary to the expected hierarchy based on the caretakers' ratings. That is, of these observed conflict interaction, 96% were in the expected direction.

**Table 2.** Dyadic Behaviors Comprising the Five Outcome Constructs

| | |
|---|---|
| Social playing<br>($M = 7.28$; $SD = 4.13$) | Associative play: both children are engaged in a common play activity (after Parten, 1932). |
| | Directed comments: the child makes a verbal comment directed to the other. |
| | Offer toy: the child offers a toy to the other. |
| | Question: the child asks a question of the other. |
| | Give toy: the child gives a toy to the other. |
| | Request: the child makes a verbal request of the other. |
| Directing<br>($M = 1.59$; $SD = 1.12$) | Instruct/prompt: the child indicates that s/he wants the other to do something. |
| | Thwart: the child prevents or stops a behavioral act of the other (vocally or physically). |
| | Take: the child takes an object from the other. |
| Passive onlooking<br>($M = 41.32$; $SD = 13.13$) | Nonresistance: the child allows a take or a thwart. |
| | Unengaged: the child is not playing with any of the toys. |
| | Attend: the child looks at face or general activity for 3 s without looking away. |
| Imitating<br>($M = 1.48$; $SD = 0.73$) | The child repeats the behavior of the other child within 10 s. |
| Complying<br>($M = .54$; $SD = 0.52$) | The child complies with a verbal request (e.g., gives a requested object). |

*Note.* These social outcome constructs are based partially on a chained *P*-technique factor analysis. Means and standard deviations are based on percentage of intervals during which a behavior occurred.

proportion of intervals in which a behavior occurred over the 5-min segment.

Based on preliminary analyses, five distinct outcome constructs emerged from the detailed behavioral coding of the dyadic interactions among the toddlers (see Table 2). These variables have been well documented in the literature on the behavior patterns of 1- to 3-year-olds (e.g., Brownell & Brown, 1992). The internal consistencies of the multiply indicated variables were good: social playing, $r_{xx} = .77$; directing, $r_{xx} = .60$; onlooking, $r_{xx} = .78$. As single indicators, estimates of measurement validity for complying and imitating were not possible, but, as mentioned, observer reliability for these behaviors was acceptable. Notably, conflict-related variables (aggression, protest, crying) occurred too rarely to be included in the current analyses. This fact did not hinder the

testing of our hypotheses because we were interested in the effect of social dominance outside of the context of conflict.

## Analytic Procedures

*Unit of analysis.* Following procedures described by Gonzalez and Griffin (1997), the information from each of the 74 dyadic interactions was represented twice, once for the focal child and once for his or her partner. From the 148 observations (i.e., 2 × 74 dyads) two mean-augmented covariance matrices were calculated, one for each grouping based on degree of familiarity (i.e., established and acquainted dyads). We based our significance tests on the number of dyads ($n = 74$; cf. Gonzalez & Griffin, 1997). Because not all children were seen an equal number of times in the play situation, the data matrix was weighted to equalize each child's contribution and to minimize the probability that results would reflect the behavior of one child more than another.

*Modeling procedures.* To examine the predictors of dominance, the mediating effect of rank on the social outcomes, and the moderating effect of familiarity (Baron & Kenny, 1986), we used mean and covariance structures (MACS; Little, 1997) analyses with LISREL (Jöreskog & Sörbom, 1989).[2] Specifically, the path model examined both a child's individual-level qualities (e.g., the developmental maturity of the child) and his or her behavior within the context of a social interaction (e.g., amount of social playing within the context of a dyadic interaction). This model included the four individual-level attributes as predictor variables, each child's dominance rank as a mediating variable, and the five outcome variables reflecting the behavior of a child in the dyadic interaction. Questions addressed in this model include: (a) to what degree is a child's rank dependent on his or her developmental age, gender, temperament, and tenure, (b) to what degree does a child's rank mediate these individual-level attributes, and in turn affect social behavior within the context of a dyadic interaction, and (c) does the degree of familiarity moderate these relationships?

During model estimation, theoretically relevant paths were estimated for both groups (established and acquainted dyads). Across groups, estimates that were within two standard errors of each other were tested for equality and nonsignificant paths were dropped. The

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[2] MACS modeling is a variation on traditional structural equation modeling procedures where mean-level information is modeled along with variance–covariance information. These procedures allow tests of cross-group differences in the causal path structure (Little, 1997).

final model shows only significant paths ($p < .05$) that were either constrained to equality ($p > .20$) or were unique to the different levels of familiarity ($p < .01$).

*Validity checks.* In addition to using a weighted covariance matrix to minimize the probability that some children would be represented more than others, additional validity checks were conducted on the parameters of the final model. Specifically, the model was rerun 16 times, each time with a different child removed. These validity checks explore whether removing a single child yields different estimates of the relations among the variables. The percentage of estimates that showed no change (i.e., significant and within ± one standard error of the corresponding estimate from the final model) are reported later. The consistency of these validity checks also speak to (a) the adequacy of the 5-min interval to capture meaningful behavioral differences and (b) the generalizability of the overall findings within the context of the current sample.

*Relational-level analyses.* Also conducted were three relational-level analyses. First, a hierarchical regression analysis was conducted to examine the predictive strength of the relative relational variables. For each primary effect from the path analysis, we also calculated two relational-level predictors using the respective variables associated with a child and his or her partner: (a) a mean score (e.g., average social dominance rank of the two children in a dyad) and (b) a difference score (e.g., difference in social dominance ranks of the two children in a dyad). Second, the correlations among the outcome variables across partners were examined. Third, we highlight types of behavioral changes that occur according to partner identity with two example children. Here difference scores were calculated between the two children composing the dyad. The primary question addressed in these analyses is, to what degree is a child's social behavior within the context of a dyadic interaction dependent upon relative relational characteristics of both participants?

## RESULTS

The results are organized in two sections. Presented first are the path models indicating the individual-level predictors of social dominance, the mediating role of social dominance, and the moderating effect of familiarity. In the second section, the analyses of the influence of the relational aspects of the interactants are presented.

## Individual-Level Model

The fit of the final model, presented in Figure 1, was very good, $\chi^2$ (72, $n = 74$) = 43.3, $p = 1.0$, and the validity checks showed 98.4% agreement (i.e., 252 out of 256 times, the central estimates cross-validated, tenure failed to reach significance four times, but its effect was in the same direction). On the whole, these results show that the model is quite robust and generalizable in this sample of toddlers.

Broadly speaking, the pattern of relations among the variables and across the two groups supported the hypotheses that (a) dominance rank is strongly predicted by individual-level attributes, (b) dominance rank mediates the children's behavior in nonconflict interactions, and (c) these mediational effects are moderated by degree of familiarity.

*Relationships independent of degree of familiarity.* As expected, the predictors of rank did not differ across established and acquainted dyads, given that this representation is at the level of the child and not the relationship. As seen in Figure 1, the strongest predictor of social dominance rank is developmental maturity ($\beta = .68$). That is, dominant children tended to be the oldest, largest, and most cognitively advanced.[3] With the other effects being controlled for, socially dominant toddlers also tended to be girls ($\beta = -.25$)[4] and more persistent ($\beta = .39$). The length of time a child had been at the daycare center (tenure) also exerted a slight effect ($\beta = .12$). In both groups (i.e., established and acquainted relationships), 72% of the variance in social dominance rank was accounted for by these four predictor variables.

As seen in Figure 1, another common effect emerged, over and above the effects of the independent variables. Specifically, social dominance rank predicted the degree to which a child engaged in directing behavior; however, the magnitude of this effect was moderated by familiarity ($p < .01$)—for established relationships (i.e., with well-known partners), $\beta = .51$, and for acquainted relationships, $\beta = .35$. Here, the higher the child was in the hierarchy, the more likely s/he would issue instructions, thwart a partner, and take things from a partner.

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[3] We examined the relative contribution of physical size (mean of height and weight), mental age, and chronological age to dominance rank. Of the variance accounted for by these variables, nearly two thirds of it was common to all variables and just under one third was due to mental age alone. The small remainder was due to age and size.

[4] There were no significant zero-order correlations between rank and gender. In other words, girls do not necessarily hold the top positions of the hierarchies. But, when the other effects are controlled for (i.e., all other things being equal), being a girl in this group suggested a competitive advantage.

## Established (Within-Playgroup) Relationships
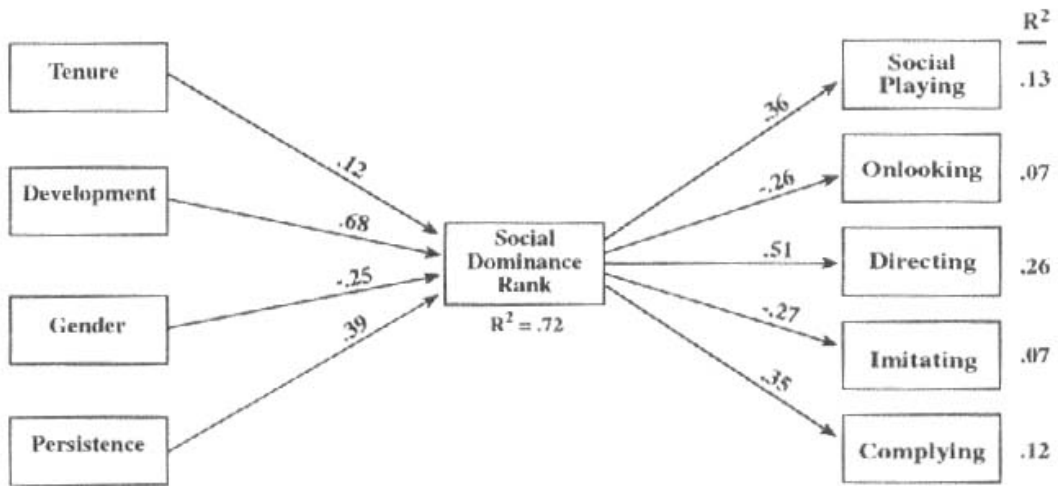


## Acquainted (Across-Playgroup) Relationships
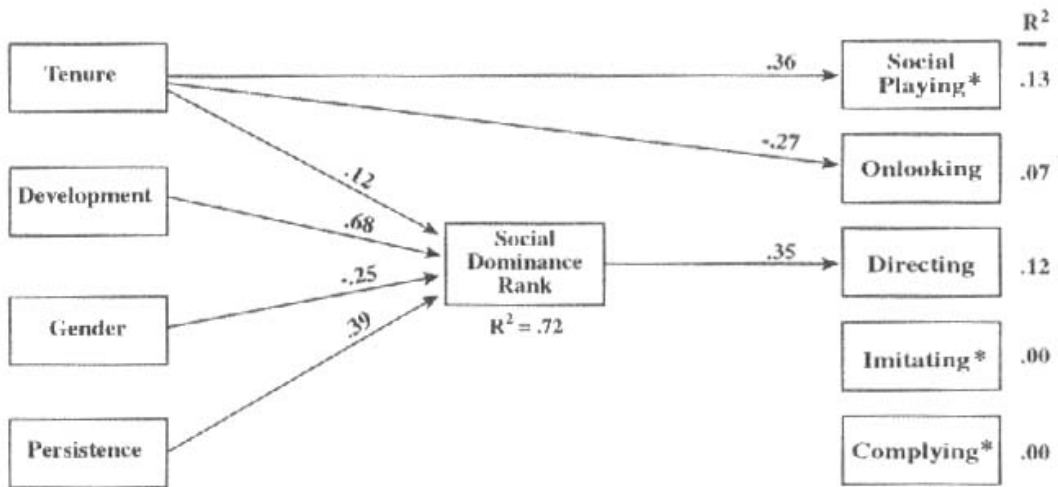


* The acquainted group of dyads showed significantly lower means of the behaviors

*Figure 1.* The mediating effects of social dominance rank and the moderating effects of familiarity. Values from the common-metric standardized solution are presented.

*Effects unique to knowing your partner well.* In established relationships, social dominance rank mediated the individual-level influences, predicting all five outcomes. Specifically, higher social dominance rank predicted more engagement and mutual play (social playing, $\beta = .36$), less passive observing of a partner (onlooking, $\beta = -.26$), more directing

**Table 3.** Unique Predictive Effects of Relational-Level Variables

| Outcome construct | Relational-level predictor | $R^2$ | $\Delta R^2$ | F | p |
|---|---|---|---|---|---|
| *Established dyads* | | | | | |
| Directing | Difference in rank | .35 | .09 | 4.45 | .04 |
| Onlooking | Difference in rank | .18 | .11 | 4.65 | .04 |
| Social playing | Average rank | .24 | .12 | 4.61 | .04 |
| Complying | Average rank | .14 | .02 | 0.54 | .47 |
| Imitating | Average rank | .08 | .01 | 0.31 | .58 |
| *Acquainted dyads* | | | | | |
| Directing | Difference in rank | .20 | .08 | 3.96 | .06 |
| Onlooking | Difference in tenure | .13 | .06 | 2.38 | .13 |
| Social playing | Average tenure | .15 | .02 | 0.97 | .33 |

*Note.* Degrees of freedom for the incremental-*F* test in the established dyads was 1 and 34, and for the acquainted dyads was 1 and 36.

(as mentioned), less imitating (imitating, $\beta = -.27$), and more compliance with a partner's requests (complying, $\beta = .35$).

*Effects unique to not knowing your partner well.* In the acquainted dyads, the amount of social experience in the daycare facility (tenure) was the pronounced predictor of behavior in the dyadic interactions (not withstanding the effect of social dominance rank). Tenure predicted the amount of social playing ($\beta = .36$) and the amount of onlooking ($\beta = -.27$). In dyads where the children were merely acquainted, children who had been in the daycare center longer played more and watched less than did children who had less social experience in the center.

In addition to these relations, three mean differences and one variance difference emerged between established and acquainted relationships. Specifically, compared with the established group, acquainted children showed less social playing, less complying, and less imitating (for each, the difference was equal in magnitude, $p = .50$, and the standard-unit difference was .34, $p < .01$); the acquainted children also showed more variability for imitating (i.e., were more heterogeneous, $p < .01$).

## Relational-Level Effects

Table 3 shows the predictive effects of the relational-level variables on the five social outcomes. Although not always significant ($p < .05$), these relational-level predictors for the most part had unique predictive
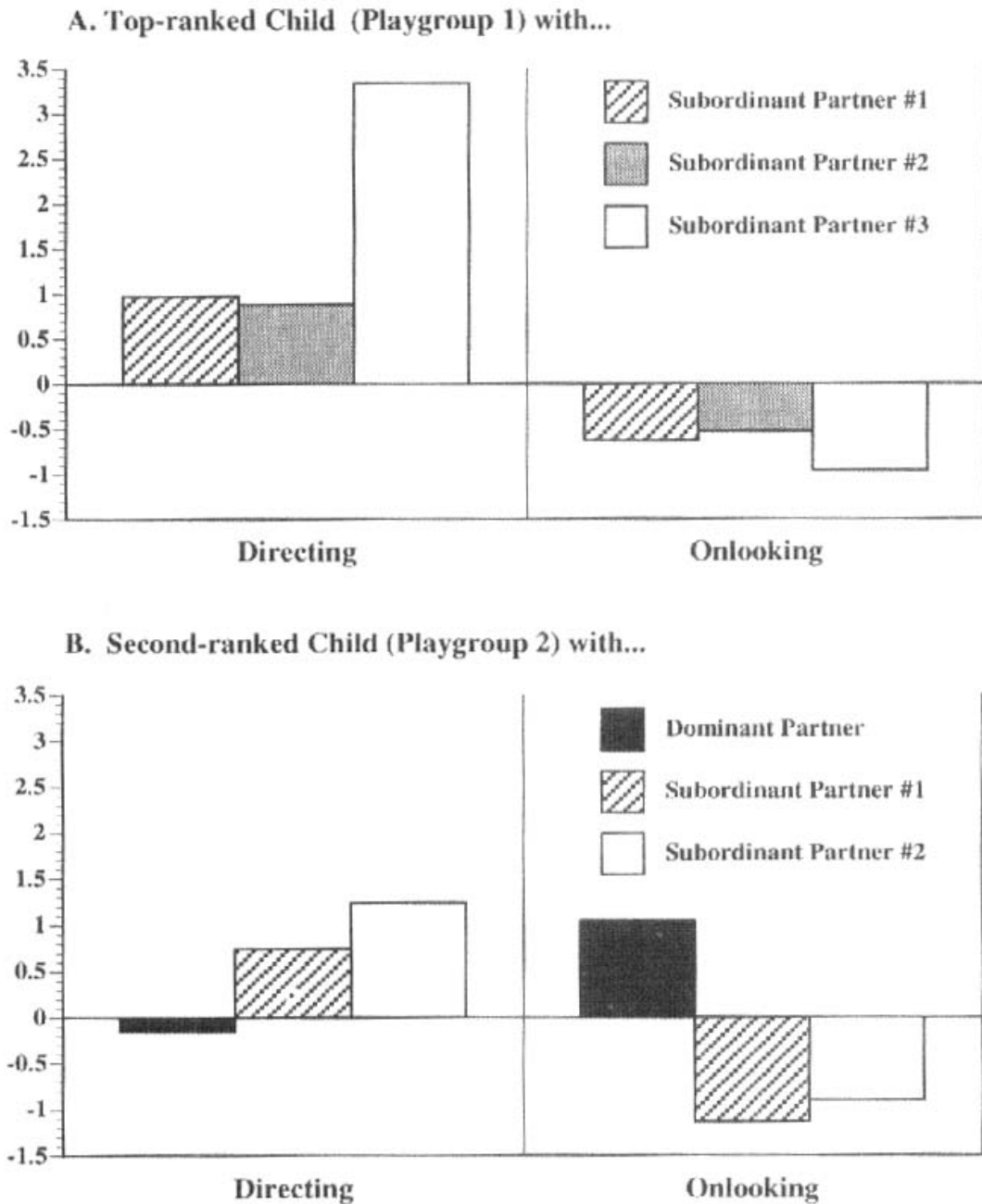
**A. Top-ranked Child (Playgroup 1) with...**



**B. Second-ranked Child (Playgroup 2) with...**



*Figure 2.* Relative behavioral changes in dyadic interactions (represented by difference scores) of two exemplary children with three partners of various relative dominance ranks.

effects on the behavior of the children in the dyadic interactions. One effect was common to both groups, but the magnitude was moderated by familiarity. In particular, for both established ($p < .05$) and acquainted dyads ($p < .06$), differences in social dominance rank predicted the level

**Table 4.** Within-Child and Between-Partners Correlations Among the Outcome Variables

| | Social playing | Directing | Onlooking | Complying | Imitating |
|---|---|---|---|---|---|
| | *Within-child correlations* | | | | |
| Social playing | 1.00 | | | | |
| Directing | 0.38 | 1.00 | | | |
| Onlooking | 0.13 | −0.58 | 1.00 | | |
| Complying | 0.32 | *0.00* | 0.08 | 1.00 | |
| Imitating | −0.18 | −0.23 | *0.05* | −0.10 | 1.00 |
| | *Between-partner correlations* | | | | |
| Social playing | 0.79 | | | | |
| Directing | 0.25 | −0.04/−0.35 | | | |
| Onlooking | 0.28 | 0.76 | −0.71 | | |
| Complying | 0.58 | *0.00* | −0.05/0.15 | *0.12* | |
| Imitating | *−0.12* | −0.01 | −0.03 | −0.15 | 0.12 |

*Note.* Correlations in italics are not different from zero ($p < .05$). These correlations, which are constrained maximum likelihood estimates, are equal in both established and acquainted dyads, $\chi^2$ (23, $n = 74$) = 24.1, $p = .40$, except the two correlations separated by a slash, which are listed as established/acquainted. Within-child correlations are the correlations among the outcome variables for a given member of the dyad. Between-partners correlations are between the two dyad members.

of directing that a child engaged in. The greater the distance in rank between the two children, the more the child of greater rank engaged the play material, issued instructions, and so on. In established dyads, greater differences in rank also predicted less onlooking, and average rank among the interactants predicted more social playing. Notably, both complying and imitating did not show significant increases in explained variance when the relational-level predictor was added. The lack of increase also occurred in acquainted dyads for onlooking and social playing. However, the nonsignificant relational effects did show trend-level influences.

To illustrate further the relational phenomena, we present the intra- and intermember correlations among the outcome variables in Table 4 and a follow-up comparison among individual children, which is presented in Figure 2.

*Between-partner (intradyad) behavioral dependence.* Before turning to the relational-level correlations, we first describe the within-child correlations. Two features are particularly relevant. First, as seen in the correlations among the social outcomes (at the individual level), the

social outcomes capture generally discrete behaviors (i.e., low correlations). Social playing was moderately positively related to both directing and complying, with about 10% overlapping variance. Directing and onlooking had a moderately negative relationship, sharing approximately 28% common variance.

The second notable feature can be seen in the between-partner correlations (i.e., the correlations between the two members of the dyads). Across all interactions in both established dyads ($n = 36$) and acquainted dyads ($n = 38$), four correlations were quite substantial ($p < .01$), whereas the remainder were generally small or nonsignificant. As expected, when one member was engaged in social playing so too was the other ($r = .79$). The other member was also complying to the verbal requests of his or her partner while engaging in social play ($r = .58$). Similarly, when one member was directing the activities, the other member quite often sat unengaged and attended to the other ($r = .76$), and when one member was unengaged and attending, the other toddler was less likely to be doing the same ($r = -.71$). Thus, from a relational perspective, these correlations indicate that much of a toddler's behavior in a dyadic interaction is dependent upon the behavior of the other child. On the other hand, 53% of these correlations were functionally independent (nonsignificant or quite small). These correlations describe the group relationships as a whole. To better understand the intraindividual nature of these relational patterns, we turn to Figure 2.

*Changing behavior according to partner identity.* In Figure 2, mean differences on two social outcomes of two children and three of their within-care group partners are presented to illustrate in detail the social phenomena reflected in the models.[5] Figure 2A shows the differences in behavior between the highest ranked child of Care Group One with three social partners. Figure 2B shows the differences in behavior between the second-ranked child of Care Group Two with three social partners. As seen in the figures, the top-ranked child issues more directives to each social partner than do the social partners to the top-ranked child, and engages in onlooking less than do the lower ranked social partners. In contrast, the second-ranked child issues fewer directives and onlooks more with the higher ranked child (solid black bar), but issues relatively more directives to and onlooks less with lower ranked children.

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[5] Note that difference scores were calculated as the focal child's value minus his or her partner's. For the difference scores, because outcome variables reflect the focal child's behavior, the effects on the partner's behavior would be in the opposite direction.

## DISCUSSION

The primary goal of the current study was to explore social dominance expressly in the context of toddlers interacting within their interpersonal relationships. A number of related questions were posed that focused on: (a) What personal attributes of a child predict his or her social dominance relations within a social group? (b) Does relative dominance standing influence the course of social interactions outside of the context of conflict? (c) Do relative relational differences in social dominance uniquely influence the behavior of children in such nonconflict interactions? As seen in the results, the answers to these questions broadly supported expectations derived from both evolutionary and relational perspectives. In light of the ages of these toddlers (1 to 3 years), the emergence of these clear patterns is particularly noteworthy.

Before turning to the implications of the findings, we emphasize that this study represents a first detailed examination of the mediating effects of social dominance on the social behavior of young toddlers. As such, at least one feature of our approach may be considered a potential weakness. In particular, how generalizable are findings based on a sample of 16 toddlers? Although the findings appear to be quite robust and generalizable to this group of toddlers, whether this group of toddlers is broadly representative of toddlers in other types of daycare remains an important focus for continued work. On the other hand, the strengths of this study are numerous. From a design perspective, the systematic pairing of the children, the balanced weighting of the data, and the validity checks of the final model are important strengths. In addition, the analytic approach allowed us to "view interdependence [across dyads] as an opportunity to ask novel research questions, [and] not as a problem to avoid" (Gonzalez & Griffin, 1997, p. 272). These methodological features, coupled with the overall and robust pattern of findings, broadly support the theoretical perspectives that motivated this endeavor.

### Social Dominance as a Mediator

Until now, the mediating effect of dominance, to the best of our knowledge, has never been explicitly addressed experimentally. For example, although descriptive correlations among affiliation patterns and dominance structures have been explored (LaFreniere & Charlesworth, 1983; Russon & Waite, 1991; Strayer & Trudel, 1984), apart from morphological characteristics, less visible psychologically-based predictors of social dominance have not been examined in young children (cf. Savin-Williams et al., 1981). We examine both types simultaneously.

These predictors, in our opinion, are especially important from the social relations perspective because multiple encounters are required to know the consequences of these attributes of others.

*Dominance as dependent variable.* In this group of toddlers, the driving force of social dominance appears to be cognitive and physical maturity. More developed children are better competitors with their peers. This point is compatible with work emphasizing the role of size and physical development (e.g., Savin-Williams, 1979), but further analyses suggested the primacy of cognitive development over physical size. In addition, personal attributes other than age contribute to social dominance. Experience with the daycare context and peers (i.e., tenure) plays a moderate role, as does temperamental persistence (see Figure 1).

Another predictor of dominance was gender. Independent of other effects, girls were more socially dominant than were boys (see Figure 1; cf. LaFreniere & Charlesworth, 1987). This finding may seem counterintuitive given the nature of the construct (i.e., prevailing) and the common conception that young boys are more aggressive and willful than are young girls. On the other hand, between the ages of 2 and 5, few gender differences in aggressive behavior have been reported (e.g., Cummings, Iannotti, & Zahn-Waxler, 1989) and no differences in submissive and assertive behaviors are evident (Deluty, 1985). Gender differences in these behaviors may not emerge until around the age of 3 (e.g., Maccoby & Jacklin, 1980), the age of our oldest participants. In studies where boys were more dominant (e.g., LaFreniere & Charlesworth, 1987), participants were at least 3 years old.

In addition, social dominance can be achieved a number of ways (Hawley, 1999). Prevailing in object-centered negotiations, for example, does not require aggressive behavior—it can entail social finesse such as being appropriately opportunistic or persuasive. These "prosocial strategies" (Hawley, 1999; Hawley, Pasupathi, & Little, 1998) may favor girls over boys (e.g., Serbin, Sprafkin, Elman, & Doyle, 1982). We interpret these results with caution, however, in light of the relatively small sample on which they are based.

In general, these findings support the utility of conceptualizing dominance status as a dependent variable (e.g., Bernstein, 1987) and highlight the utility of exploring its predictors at various stages of development (e.g., Hawley, 1998; Hawley et al., 1998). It may be tempting to conclude that caretakers merely order children by age. Although age is a relevant factor, prevailing over peers clearly requires more than the ability afforded by age, not the least of which is the drive to do so. The oldest child in the group may not be a resource controller in the pres-

ence of peers because s/he is, for example, withdrawn and inhibited. Similarly, a persistent 2-year-old who is experienced with the daycare setting may be socially dominant over a less experienced 3-year-old. Given that no newcomers were present in the daycare facility (i.e., the 16 toddlers had been in the daycare setting at least 5 months), the fact that tenure effects emerged at all suggests that these effects may be even more pronounced in groups experiencing compositional change.

*Dominance as an independent variable.* For established dyads, the effects of the individual-level variables were channeled through the construct of social dominance. Social dominance had an effect over and above the individual-level variables on the social outcomes. Children higher in social dominance, relative to other group members, engaged in more active toy engagement (i.e., less onlooking) and directing behavior (issuing instructions, taking things from the other child, and thwarting the other child's behavior) regardless of degree of familiarity with their play partner.

In general, dominant children spent more time engaged in the activity (i.e., higher resource utilization; LaFreniere & Charlesworth, 1987) and made more attempts to influence their subordinate peers than vice versa (e.g., Pettit, Bakshi, Dodge, & Coie, 1990; Weisfeld et al., 1980). This outcome can be considered a criterion-related validity check on the caretakers' assessments. However, given the broad behaviors exhibited in the dyadic interactions independent of indicators of conflict that (a) were influenced by social dominance but (b) were unrelated to the definition of the construct, the integrity of the conceptual independence (i.e., noncircularity) is clearly supported. This conceptual independence is also evident in the distinctive patterns found for the moderating effects of familiarity and the relative relational changes in a child's behavior depending upon his or her partner (see Figures 1 and 2, and Table 3).

## The Effects of Dominance Moderated by Familiarity

The magnitude of the effect of dominance rank on active engagement and directing was stronger within established relationships than acquainted relationships. The remainder of the effects of social dominance also varied considerably according to the nature of the relationship between the two children involved in the interaction. Dominance exerted an accentuated effect in dyads where the children knew each other well (i.e., established relationships). Familiarity alone is known to influence the ongoing coordinated activity of young children because they can anticipate the behavior of their familiar partners and under-

stand their intentions (e.g., Doyle, Connolly, & Rivest, 1980). Similar processes probably solidify the representation of the dominance differential (i.e., win–loss history), a hypothesis unique to the theoretical perspectives advocated here.

*Subordinance and passivity.* Across these dyadic relationships, subordinate children adopted a passive stance in the presence of dominant peers (i.e., less activity and more visual regard). The detection of this association is not new (e.g., Abramovitch, 1976; Abramovitch & Grusec, 1978). The argument in previous work (and that on primates) has been that subordinate children look at and watch dominant children more than vice versa in order to learn effective ways to interact with the environment and to keep track of a potentially harmful individual (Chance, 1967).

In the current study, however, two features cast a unique light on this finding. First, the social relations approach defines dominance relative to the identity of the social partner. Second, attending behavior also was correlated with lack of toy engagement (i.e., passivity). Similar behavior patterns, characterized by disengagement, have been found in socially stressful situations, which may be associated with elevated adrenal activity (e.g., Legendre & Trudel, 1996). Importantly, this additional finding suggests that onlooking behavior may reflect an overall reluctance to freely interact with the environment in the presence of a socially dominant peer (i.e., an effect that is not limited to top positions) perhaps reflecting fear or deference.

In dyads where children knew each other well, subordinate children imitated dominant children more than vice versa. Asymmetry in imitation as a function of social dominance has been found by others (Abramovitch & Grusec, 1978; Russon & Waite, 1991) but these results are not consistent (Smith & Guerney, 1977). Nonetheless, this finding is in line with social learning theory that suggests that powerful individuals are optimal models for imitation (e.g., Bandura, 1977).

Also within established dyads, socially dominant children engaged in more social play. This finding may reflect an overall accentuated activity level and evident facility to engage both the physical and social environments (Savin-Williams, 1979; Sluckin & Smith, 1977; Strayer & Strayer, 1976). For example, some socially dominant children appear to be especially effective at engaging the help of peers (LaFreniere & Charlesworth, 1987; Wright, Zakriski, & Fisher, 1996). Socially dominant children appear also to be more compliant with their partners' requests than vice versa. Perhaps dominant children are more socially responsive than subordinate children as a function of their social inclinations or are respon-

sive to requests in ways that do not relinquish their control (e.g., they may give up less preferred items; Hawley, 1998).

In dyads where the children are merely acquainted, the effects of social dominance were considerably dampened. Given our theoretical approach, such dampening should occur because the win–loss histories among the children are not as extensive or as salient as they are with children who encounter each other more frequently (i.e., in the same care group). In acquainted dyads, experience in the daycare center with peers predicted whether a child engaged in social play or onlooking behavior. Notably, however, this effect supports our basic argument in that tenure reflects an emerging win–loss history, but not yet a fully established relationship.

## Relational-Level Effects

Another important result was the unique amount of variance accounted for in the social outcomes by the relational-level variables (e.g., social behavior predicted by the difference in two children's ranks; see Table 3). According to theory, the effects of dominance asymmetry should be stronger in dyads who know each other well and whose social ranks are further apart. Children who are dominant over their social partners issue more directives when the social distance between them is greater. Importantly, this relational effect applies regardless of whether the distance is between the first and third positions or the sixth and eight positions. Some work suggests, however, that this effect may be diminished by a friendship relationship between the two interactants (La-Freniere & Charlesworth, 1987).

## Theoretical and Metatheoretical Considerations

The principles of evolution by natural selection serve a metatheoretical role; namely, they inform hypotheses regarding the origins and functions of complex adaptive psychological and social mechanisms (Buss, 1996; Charlesworth, 1988). As such, these principles stimulate hypotheses concerning the conditions under which such mechanisms would emerge and the behavioral form they might take. Important, yet often overlooked, is that models incorporating evolutionary theory do not suggest immutability of behavior, but rather they specify conditions in which behavioral flexibility and specific types of adaptations to the proximate conditions may be expected (e.g., Charlesworth, 1988; Maynard Smith, 1974).

In support of this point, our study is a sample case. First, the ability and motivation to acquire resources is fundamental to survival (as well

as successful reproduction)—the veritable cornerstone of evolution by natural selection. Accordingly, we hypothesized that even young toddlers develop the facility to know where they stand with other group members and use this information to guide their social intercourse adaptively. Such avoidance of reckless contests appears to be a general principle in many social mammals who have developed ritualized signal systems designed to size each other up before an actual contest (Alcock, 1989).

Social dominance, as defined here, should not be confused with trait theories of dominance common to personality theorists (e.g., Moskowitz, 1993; Mudrack, 1993) nor with gene-for-dominance approaches characteristic of early sociobiology (e.g., Suarez & Ackerman, 1971). In contrast, we proposed a social relations view of social dominance whereby dominance summarizes a manifest asymmetry in abilities to prevail in resource-directed competition (Hawley, 1999). This view is consistent with similar approaches where dominance is viewed as a property of conjoint activities (e.g., Gottman & Ringland, 1981). Also, relationships between unrelated individuals can have no genetic basis, yet, the person-related characteristics influencing these relationships can (Bernstein, 1987). The logical consequence of this view is that dominance hierarchies are summaries of asymmetrical relationships, and as summaries, hierarchies are epiphenomena with no function or organizing ability in and of themselves (Archer, 1992; Tinbergen, 1953; Williams, 1966). In other words, dominance hierarchies have not evolved, but resource-directed behavior has.

## CONCLUSIONS

By focusing on the interpersonal relationships composing a social group and the individuals that participate in those relationships rather than on the overall group structure (i.e., being dominant relative to a given social partner rather than relative to the group as a whole), we uncovered some new insights about the social behavior of toddlers. Our approach extended the traditional way of exploring social dominance in three important ways. First, observing multiple pairings allowed us to study social interactions that otherwise would be overlooked by observing children in free play, especially, for example, relationships characterized by avoidance or ambivalence. In fact, these relationships may contain the most subtle and influential impacts of social dominance (e.g., deference behavior). Second, dominance was not considered solely as an average relative to the group, but relative to the immediate

social context (i.e., the dyadic partner). In this way, inequity inherent in interpersonal relationships was emphasized. A child of low rank relative to the group can still be dominant, as long as s/he is in the presence of an even lower ranked child. Third, we expanded the exploration of the predictors of social dominance to include less visible individual attributes that highlight the role of ability, motivational factors, and interpersonal experience.

Even before the age of 3, children behave as if these inequities are not only salient, but that they are socially relevant in everyday play behavior. Dominant children demonstrate facility to interact with the environment unhindered, whereas their subordinate peers decline to do so, at least in the presence of dominant peers. Although this phenomenon was related to individual-level characteristics (e.g., development, peer experience, and temperament; see Figure 1), these behavioral patterns are not intraindividually stable across partners. Contrary to prevailing expectations that toddlers cannot accommodate their behavior to individual differences in social partners until the preschool years (Brownell & Brown, 1992), children subordinant to a peer behave one way, and the same child, when dominant to another peer, behaves another way (see Figure 2).

A number of studies have addressed dominance developmentally (e.g, Pettit et al., 1990; Strayer & Trudel, 1984; Wright et al., 1996). In a similar tradition, our focus on interpersonal relationships highlights the role of developmental change in social interactions from infancy and toddlerhood, through the school years, and into adulthood (e.g., Hawley, 1999). In our view, the results of this study, and the theoretical perspectives within which they are embedded, raise novel yet important developmental questions. For example, the impact of stability and change on the relationship dynamic can be explored: How do children begin the sorting process upon initial encounter, and do dominance relationships influence later play preferences, friendships, and overall social integration and acceptance?

Finally, we wonder about the developmental outcomes of children who consistently rise to the top or sink to the bottom of the social dominance hierarchy. In light of the fact that conflict in the peer context may affect such central psychological constructs as self-concept, efficacy, esteem, and relatedness feelings (Bandura, 1997; Shantz & Hobart, 1989), a critical question for developmentalists is, to what degree do these early win–loss histories influence the later development of such characteristics of the self? Early competition in the peer group could shape a child's sense of personal control, future efficacy in the social

and material domains, and personal competencies and interests. From our perspective, interfacing evolutionary theory and developmental approaches offers new opportunities to understand our place in nature as well as our ontogenetic sensitivities.

## REFERENCES

ABRAMOVITCH, R. (1976). The relation of attention and proximity to rank in preschool children. In M. R. A. Chance & R. R. Larsen (Eds.), *The social structure of attention.* London: Wiley.

ABRAMOVITCH, R., & GRUSEC, J. E. (1978). Peer imitation in a natural setting. *Child Development, 49,* 60–65.

ALCOCK, J. (1989). *Animal behavior: An evolutionary approach.* Sunderland, MA: Sinauer.

ALEXANDER, R. D. (1979). *Darwin and human affairs.* Seattle: University of Washington Press.

ANGLEITNER, A., & OSTENDORF, F. (1994). Temperament and the big five factors of personality. In C. F. Halverson, G. A. Kohnstamm, & R. P. Martin (Eds.), *The developing structure of temperament and personality from infancy to adulthood.* Hillsdale, NJ: Erlbaum.

ARCHER, J. (1992). *Ethology and human development.* New York: Harvester Wheatsheaf.

BANDURA, A. (1977). *Social learning theory.* Englewood Cliffs, NJ: Prentice-Hall.

BANDURA, A. (1997). *Self-efficacy: The exercise of control.* New York: Freeman.

BARON, R. M., & KENNY, D. A. (1986). The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51,* 1173–1182.

BERNSTEIN, I. S. (1980). Dominance: A theoretical perspective for ethologists. In D. R. Omark, F. F. Strayer, & D. G. Freedman (Eds.), *Dominance relations: An ethological view of human conflict and social interaction.* New York: Garland.

BERNSTEIN, I. S. (1981). Dominance: The baby and the bathwater. *Behavioral and Brain Sciences, 4,* 419–457.

BERNSTEIN, I. S. (1987). The evolution of nonhuman primate social behavior. *Genetica, 73,* 99–116.

BROWNELL, C. A., & BROWN, E. (1992). Peers and play in infants and toddlers. In V. B. V. Hasselt & M. Hersen (Eds.), *Handbook of social development: A lifespan perspective.* New York: Plenum.

BUSS, D. M. (1996). The evolutionary psychology of human social strategies. In E. T. Higgins & A. W. Kruglanski (Eds.), *Social psychology: Handbook of basic principles*. New York: Guilford.

CHANCE, M. R. A. (1967). Attention structure as the basis of primate rank orders. *Man, 2*, 503–518.

CHARLESWORTH, W. R. (1988). Resources and resource acquisition during ontogeny. In K. B. M. Donald (Ed.), *Sociobiological perspectives on human development*. New York: Springer.

COSMIDES, L., & TOOBY, J. (1987). From evolution to behavior: Evolutionary psychology as the missing link. In J. Dupre (Ed.), *The latest on the best: Essays on evolution and optimality*. Cambridge, MA: MIT Press.

CUMMINGS, M. E., IANNOTTI, R. J., & ZAHN-WAXLER, C. (1989). Aggression between peers in early childhood: Individual continuity and developmental change. *Child Development, 60*, 887–895.

DAWKINS, R. (1989). *The selfish gene* (2nd ed.). Oxford: Oxford University Press.

DELUTY, R. H. (1985). Consistency of assertive, aggressive, and submissive behavior for children. *Journal of Personality and Social Psychology, 49*, 1054–1065.

DOYLE, A. B., CONNOLLY, J., & RIVEST, L. P. (1980). The effect of playmate familiarity on the social interactions of young children. *Child Development, 51*, 217–223.

EPSTEIN, S. (1980). Aggregation and beyond: Some basic issues on the prediction of behavior. *Journal of Personality, 51*, 360–391.

FULLARD, W., McDEVITT, S. C., & CAREY, W. B. (1984). Assessing temperament in one- to three-year-old children. *Journal of Pediatric Psychology, 9*, 205–217.

GONZALEZ, R., & GRIFFIN, D. (1997). On the statistics of interdependence: Treating dyadic data with respect. In S. Duck (Ed.), *Handbook of personal relationships*. New York: Wiley.

GOTTMAN, J. M., & RINGLAND, J. T. (1981). The analysis of dominance and bidirectionality in social development. *Child Development, 52*, 493–512.

GOTTMAN, J. M., & ROY, A. K. (1990). *Sequential analysis: A guide for behavioral researchers*. New York: Cambridge University Press.

HAWLEY, P. H. (1999). The ontogenesis of social dominance: A strategy-based evolutionary perspective. *Developmental Review, 19*, 97–132.

HAWLEY, P. H. (1998). *Benevolence and belligerence: Social dominance and the differentiating resource-control strategies in preschoolers*. Manuscript submitted for publication.

HAWLEY, P. H., PASUPATHI, M., & LITTLE, T. D. (1998). *Winning friends and*

*influencing peers: Strategies of control, social orientation, and well-being.* Manuscript submitted for publication.

HINDE, R. A., & STEVENSON-HINDE, J. (1976). Towards understanding relationships: Dynamic stability. In P. P. G. Bateson & R. A. Hinde (Eds.), *Growing points in ethology.* Cambridge, UK: Cambridge University Press.

ICKES, W., & TOOKE, W. (1988). The observational method: Studying the interaction of minds and bodies. In S. Duck (Ed.), *Handbook of personal relationships.* New York: Wiley.

JÖRESKOG, K. G., & SÖRBOM, D. (1989). *LISREL 7: A guide to the program and applications.* Chicago: SPSS.

KEATING, C. F., & BAI, D. L. (1986). Children's attributions of social dominance from facial cues. *Child Development, 57,* 1269–1276.

KENNY, D. A. (1990). Design issues in dyadic research. In C. Hendricks & M. S. Clark (Eds.), *Research methods in personality and social psychology: Review of personality and social psychology.* Newbury Park, CA: Sage.

KENNY, D. A., & LaVOIE, L. (1984). The social relations model. In L. Berkowitz (Ed.), *Advances in experimental social psychology.* New York: Academic.

LaFRENIERE, P., & CHARLESWORTH, W. R. (1983). Dominance, attention, and affiliation in a preschool group: A nine-month longitudinal study. *Ethology and Sociobiology, 4,* 55–67.

LaFRENIERE, P. J., & CHARLESWORTH, W. R. (1987). Effects of friendship and dominance status on preschooler's resource utilization in a cooperative/competitive paradigm. *International Journal of Behavioral Development, 10,* 345–358.

LEGENDRE, A., & TRUDEL, M. (1996). Cortisol and behavioral responses of young children in a group of unfamiliar peers. *Merrill-Palmer Quarterly, 42,* 554–577.

LITTLE, T. D. (1997). Mean and covariance structures (MACS) analyses of cross-cultural data: Practical and theoretical issues. *Multivariate Behavioral Research, 32,* 53–76.

MACCOBY, E. E., & JACKLIN, J. N. (1980). Sex differences in aggression: A rejoinder and reprise. *Child Development, 51,* 964–980.

MAYNARD SMITH, J. (1974). The theory of games and the evolution of animal conflict. *Journal of Theoretical Biology, 47,* 202–221.

McGREW, W. C. (1972). *An ethological study of children's behavior.* New York: Academic.

MOSKOWITZ, D. S. (1993). Dominance and friendliness: On the interaction of gender and situation. *Journal of Personality, 61,* 387–409.

MUDRACK, P. E. (1993). Relationship between dominance and achievement among self-report measures. *Psychological Reports, 73,* 971–977.

OMARK, D. R., STRAYER, F. F., & FREEDMAN, D. G. (Eds.). (1980). *Dominance relations: An ethological view of human conflict and social interaction.* New York: Garland.

PARTEN, M. (1932). Social participation among preschool children. *Journal of Abnormal and Social Psychology, 24,* 243–269.

PETTIT, G. S., BAKSHI, A., DODGE, K. A., & COIE, J. D. (1990). The emergence of social dominance in young boys' play groups: Developmental differences and behavioral correlates. *Developmental Psychology, 26,* 1017–1025.

RHINE, R. J., & LINVILLE, A. K. (1980). Properties of one–zero scores in observational studies of primate social behavior: The effect of assumptions on empirical analysis. *Primates, 21,* 111–122.

RUSSON, A. E., & WAITE, B. E. (1991). Patterns of dominance and imitation in an infant peer group. *Ethology and Sociobiology, 13,* 55–73.

SAILE, H. (1987). *Entwicklungspsychologische Beiträge zur psychischen Belastung von Kindern durch einen Krankenhausaufenthalt* [Developmental influences on psychic stressors of hospitalized children]. Frankfurt: Lang.

SAVIN-WILLIAMS, R. C. (1976). An ethological study of dominance formation and maintenance in a group of human adolescents. *Child Development, 47,* 972–979.

SAVIN-WILLIAMS, R. C. (1979). Dominance hierarchies in groups of early adolescents. *Child Development, 50,* 923–935.

SAVIN-WILLIAMS, R. C., SMALL, S. A., & ZELDIN, R. S. (1981). Dominance and altruism among adolescent males: A comparison of ethological and psychological methods. *Ethology and Sociobiology, 2,* 167–176.

SERBIN, L. A., SPRAFKIN, C., ELMAN, M., & DOYLE, A. B. (1982). The early development of sex-differentiated patterns of social influence. *Canadian Journal of Behavioural Science, 14,* 350–363.

SHANTZ, C. U., & HOBART, C. J. (1989). Social conflict and development: Peers and siblings. In T. J. Berndt & G. Ladd (Eds.), *Peer relationships and child development.* New York: Wiley.

SLUCKIN, A. M., & SMITH, P. K. (1977). Two approaches to the concept of dominance in preschool. *Child Development, 48,* 917–923.

SMITH, J., & GUERNEY, B. G. (1977). Effects of an adult model's dominance and honesty on children's identification and imitation. *Journal of Genetic Psychology, 131,* 223–239.

STOGDILL, R. M. (1974). *Handbook of leadership: A survey of theory and research.* New York: Free Press.

STRAYER, F. F., & STRAYER, J. (1976). An ethological analysis of social agonism and dominance relations among preschool children. *Child Development, 47,* 980–989.

STRAYER, F. F., & TRUDEL, M. (1984). Developmental changes in the nature and function of social dominance among young children. *Ethology and Sociobiology, 5,* 279–295.

SUAREZ, B., & ACKERMAN, D. R. (1971). Social dominance and reproductive behavior in rhesus monkeys. *American Journal of Physical Anthropology, 35,* 219–222.

TINBERGEN, N. (1953). *Social behaviour in animals.* London: Methuen.

TRIVERS, R. L. (1971). The evolution of reciprocal altruism. *Quarterly Review of Biology, 46,* 35–57.

VAUGHN, B. E., & WATERS, E. (1981). Attention structure, sociometric status, and dominance: Interrelations, behavioral correlates, and relationships to social competence. *Developmental Psychology, 17,* 275–288.

WEISFELD, G. E., & BERESFORD, J. M. (1982). Erectness of posture as an indicator of dominance or success in humans. *Motivation and Emotion, 6,* 113–131.

WEISFELD, G. E., BLOCH, S. A., & IVERS, J. W. (1983). A factor analytic study of peer-perceived dominance in adolescent boys. *Adolescence, 18,* 229–243.

WEISFELD, G. E., BLOCH, S. A., & IVERS, J. W. (1984). Possible determinants of social dominance among adolescent girls. *The Journal of Genetic Psychology, 144,* 115–129.

WEISFELD, G. E., OMARK, D. R., & CRONIN, C. L. (1980). A longitudinal and cross-sectional study of dominance in boys. In D. R. Omark, F. F. Strayer, & D. G. Freedman (Eds.), *Dominance relations: An ethological view of human conflict and social interaction.* New York: Garland.

WILLIAMS, G. C. (1966). *Adaptation and natural selection: A critique of some current evolutionary thought.* Princeton, NJ: Princeton University Press.

WRIGHT, J. C., ZAKRISKI, A. L., & FISHER, P. (1996). Age differences in the correlates of perceived dominance. *Social Development, 5,* 24–40.