Boys Withdraw More in One-on-One Interactions, Whereas Girls Withdraw More in Groups

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Past research predicts that males will be more likely to withdraw in one-on-one interactions versus groups, whereas females will be more likely to withdraw in groups than in one-on-one interactions. Ninety-eight 10-year-old children engaged in a word generation task either in same-sex dyads or in groups. Boys completed significantly more words in groups than in dyads, whereas girls’ performance was similar in the 2 social structures. Confirming the hypothesis, analyses of the dynamics of dyads and groups using time spent writing as a measure of effort demonstrated that boys withdrew more than girls in dyads, whereas girls withdrew more than boys in groups. Furthermore, in groups, girls were more likely than boys to focus on one individual. Causal explanations for sex differences in preferences for differing social structures are proposed.

Keywords: social structure, sex differences, groups, dyads, achievement

Identifying the most critical features of the social context that influence human beings’ interactions with one another will enhance understanding of human social behavior. Social psychologists focus on a number of important features such as the number of individuals present, their relative status, the presence of out-groups, majority–minority relations, and interactions between individuals who differ on a range of characteristics. Researchers who study nonhuman primates investigate many of these same variables, but they also study more basic features such as the age, sex, relatedness, and familiarity of the individuals, as well as the social structure formed by the members of each sex within the species.

Empirical research with human beings indicates that studies using primatologists’ more basic categories may illuminate fundamental patterns in human interactions. Specifically, as in most primate species, human males and females segregate themselves by sex and form differing social structures. The goal of this study was to examine the dynamics of sex differences in interactions in social structures. In particular, evidence suggests that males more than females interact in groups, and females more than males interact in dyads. Examination of the behavior of each sex in both social structures should help illuminate the reasons each sex demonstrates a proclivity for a specific social structure as well as generate predictions regarding the type of behavior each sex will exhibit across differing social structures.

Models of primate social behavior uniformly are predicated on information about the social structure of females and males in the community (de Waal, 1994, 2001; Wrangham, 1980, 1987, 2000). Invariably, social structure differs by sex as members of each sex pursue differing goals. The presence of individuals of different classes, categorized by sex, age, kinship, and familiarity, strongly determines social structure, as do ecological factors, typically availability and distribution of resources, parasite load, and degree of predation. Although primatologists debate the extent to which forms of social structure represent evolved algorithms versus current responses to local conditions, they concur that basic knowledge of each sex’s social structure must precede further understanding of more complex aspects of an individual’s social responses.

For human beings, evidence from numerous and diverse cross-cultural studies demonstrates sex differences in the social structures of children’s and adolescents’ relationships with familiar, unrelated, same-sex individuals of similar age. As in primate species, beginning early in childhood, the two sexes segregate their interactions (for a review, see Maccoby, 1998). Within these sex-segregated milieus, boys are more likely than girls to interact in groups, whereas girls are more likely to interact with only one other individual at a time (for cross-cultural reviews, see Belle, 1989; Cairns, Xie, & Leung, 1998; Fine, 1980; Freedman, 1974; Savin-Williams, 1980; Schlegel & Barry, 1991). Evidence indicates that this sex difference in social structure continues into adulthood (for reviews, see Baumeister & Sommer, 1997; Gabriel & Gardner, 1999; Schurz, 1902; Tiger, 1969) and can be observed as early as 3 years of age (Fabes, Martin, & Hanish, 2003).

Given this sex-differentiated pattern of social structure, the conclusion follows logically that males find one-on-one interactions more aversive than group interactions, whereas females find groups more aversive than one-on-one interactions. In support of this, Seeley, Gardner, Pennington, and Gabriel (2003) recently found that whereas males reported being attracted to groups, females reported that groups are attractive only because they afford relationships with individuals within the group. Several observational studies are consistent with these results.

Bales and Borgatta (1955) asked men to interact on four occasions with one other individual or in groups ranging in size from 3 to 7. The men discussed and proposed solutions to human relations problems that a male administrator faced in his organi-
zation. Speech form and emotional tone were measured. Results showed that men in one-on-one relationships exhibited more tension, which led to more withdrawal behavior, such as refraining from expressing conflicting perspectives. In contrast, men in larger group sizes were more relaxed, disagreed more with others’ opinions, and used more overtly antagonistic language. These authors conclude that for males, in comparison to interaction with only one other individual, group interaction reduces tension. Tension reduction occurs through decreasing the focus on an individual and providing alternate partners, mediators, and allies that could deter prolonged conflicts. As well, groups foster loyalty to a structure that is larger than the sum of its parts (Bales & Borgatta, 1955; Schurz, 1902; Slater, 1958; see also de Waal, 1989; Maccoby, 1986; Thorne & Luria, 1986; Wrangham, 1999).

Although Bales and Borgatta (1955) did not include women, studies of heterosexual marital conflicts consistently demonstrate that husbands withdraw from conflicts more than wives who become more engaged. In fact, physiological evidence suggests that men withdraw from these one-on-one interactions because they experience higher physiological arousal than women (Gottman & Levenson, 1992).

Two studies of 6- to 9-year-old boys and girls directly compared reactions to competition in one-on-one interactions versus groups (Benenson et al., 2002; Benenson, Nicholson, Waite, Roy, & Simpson, 2001). Same-sex, same-age, familiar peers played a typical turn-taking, zero-sum “board” game either against one other individual or in a larger group. The results showed that although both sexes competed more in groups than in one-on-one interactions, the effect was significantly more pronounced for boys. Although all children attempted to win, in the one-on-one interaction, boys were significantly more likely than in groups to sacrifice their own chances of winning by withdrawing through spontaneously offering to give up their own pieces to their opponent and by exhibiting depressive affect (Benenson et al., 2002). In contrast, the same boys when playing in a group were significantly more likely to pursue their own interests at others’ expense. They hurt others’ chances of winning more, expressed greater anger, and kept more postgame rewards for themselves. Girls’ behavior in the two social structures did not differ markedly.

Finally, in a classic study of group dynamics in 4- to 5-year-old children, Charlesworth and Dzur (1987) designed a movie viewer that required one child to press a light switch button and a second child to turn a crank so that a third child could view cartoons through an eyepiece. Four familiar, same-sex children of the same age were given the opportunity to view cartoons with this movie viewer apparatus. Male and female groups viewed the cartoons for equal lengths of time, but boys shared the roles of viewing, helping, and bystanding more equally within the group than girls did. By contrast, in the girls’ groups, one girl viewed the cartoons significantly more than the other girls; the three girls who spent less time viewing the movies withdrew from active competition either by spending more time in one of the helping positions or bystanding. Furthermore, within a group, the four boys did not differ significantly in the types of behavior they used. Boys with less viewing time simply lost out to boys with more viewing time, but not because they did not try. In marked contrast, within a group, the three girls with less viewing time withdrew from the interactions. They were significantly less likely than the most successful girl to use each type of physical and verbal behavior that helped a child to gain access to the movie viewer.

Together, these studies with preschool-aged children through adults using a variety of tasks indicate that the same form of social structure elicits differential responses from each sex. In particular, past studies indicate that males withdraw more than females from one-on-one interactions, whereas females withdraw more than males from groups. The aim of the present study was to examine this prediction explicitly.

A concrete task was designed that was attractive to individuals of both sexes to compare the performance of the two sexes in one-on-one interactions versus groups. Critical to the validity of this study was that the task simulate natural group dynamics for both sexes to the greatest extent possible within any one study. Extensive reviews of research on naturally occurring groups across cultures indicate that groups frequently involve individuals’ specializing in differing roles and cooperating with one another from their own unique vantage points (for reviews, see Brown, 2000; Ridley, 1996). Therefore, a word generation task was created because it would permit individuals both to specialize and to cooperate but, above all, to be free to choose how to interact with one another with a minimal number of constraints. Ten-year-old children were chosen for participation because by this age, they have had extensive experience in sex-segregated peer cultures interacting in sex-typed social structures (for a review, see Maccoby, 1998). Children participated in dyads and groups of five because these two group sizes clearly produce differing dynamics (Bales & Borgatta, 1955).

Method

Participants

Ninety-eight children (males: \( M = 10.64 \) years, \( SD = 0.66 \); females: \( M = 10.82 \) years, \( SD = 0.50 \)) in seven classes from three schools in Plymouth, England participated in the study with either one other individual or in groups of five. Over 98% of the children were White and born in Great Britain. Socioeconomic status in England is measured by percentage of free lunches provided to children at school. Percentages ranged from 8% to 15%, indicating that the children’s environment in all schools ranged from lower- to middle class.

If more than 7 children of the same-sex from the same class received parental consent, teachers organized children into friendship groups. The female researcher (Anna Heath) collected the data then randomly assigned individuals to a same-sex dyad or group of five. In total, seven male dyads, seven male groups, seven female dyads, and seven female groups were formed. Data were collected after children had been in class together for 6 months to ensure they were familiar with one another so that interactions would be as natural as possible.

Materials

The task was designed on the basis of research indicating that both task specialization and cooperation characterize natural group interaction (Brown, 2000; Ridley, 1996). A word generation task using a finite number of discrete categories permitted individual children with experience in a specific category to specialize in a category. By ensuring that the requirements of the task exceeded most children’s capacities, however, cooperation between children was encouraged. Categories were selected because they were familiar to children of primary school age but were not ones that children memorize as part of their formal education.
Each word generation task included six categories that provided a selection from which to choose. Further, eight letters within a category allowed a child to specialize exclusively in one category. To complete a card, four words were required that fit in a category and began with the same letter. Because few children of this age could generate four words beginning with the same letter within a specific category, this requirement encouraged cooperation between children. Pilot testing demonstrated that 10-year-old children could generate three words without eliciting help from others. When five words were tested during the pilot studies, children complained of difficulty completing a card. Therefore, four words were selected for the actual task.

To minimize the probability that a child who had not yet participated in the study could benefit from advance knowledge of the categories, seven sets of six categories were created. Each category was generated by creating novel ways of parsing the word that nevertheless would be understandable for children of this age. None of the same sets was used on the same day of data collection or within the same classroom. Use of seven sets also ensured that the results were not because of a particular set of categories. The seven sets of categories and accompanying letters are presented in Table 1. One male dyad, one male group, one female dyad, and one female group received each of the seven sets.

Each dyad/group of children received 48 7 cm × 8 cm brightly colored cards, grouped into six categories, each of which was identifiable by a unique color. The eight cards of the same color within each category contained the title of the category at the top of the card followed by one of eight letters. The same eight letters were used for each of the six categories. Four horizontal lines were printed beneath the title of the category and the letter. To complete a card, children had to generate four words that began with the letter that fit within the category.

To illustrate how to perform the task, children were shown an example (see Figure 1). In the example, eight blue cards were printed with the title “Birds” at the top. Each card contained a different letter: S, D, R, C, P, H, T, or M. The four lines underneath were completed as an illustration. For the example, for the card entitled Category: Birds Letter: S, the words sparrow, starling, seagull, and swan were printed. Children also were shown the titles of five other categories. They were told that for each category, they had to generate four words beginning with each of the eight letters. Children then were asked to provide examples for several of the other categories to verify that they understood how to complete the cards. All children quickly grasped the procedure.

Procedure

The procedure was pilot tested with several groups of children and modifications incorporated to ensure that the setting and task were appropriate for children of this age. The researcher brought either one dyad or one group to a large room (e.g., cafeteria, music room, or teachers’ lounge) at the school where the children were seated on the floor 3 m in front of a camcorder mounted on a tripod. Each dyad and group completed the task alone with only the researcher present.

Pilot testing showed that providing chairs or tables strongly influenced the interactions of the children. Consequently, for the actual study, no seating arrangement was provided so that the children alone had sole responsibility for determining how to position themselves on the floor.

After the task had been explained to the children, each dyad/group was informed that the teacher of the dyad/group who was able to complete the most cards in 15 min would receive a plaque containing the winners’ names. One plaque was given to the winning dyad and a second to the winning group. Plaques were provided because research consistently demonstrates that the opportunity to receive a reward enhances positive group sentiment and cohesiveness (Brown, 2000). At the same time, because the reward structure can influence the performance of children, the type of reward was selected to provide minimal impact. The presentation of a collective plaque translated into public acknowledgment for the dyad/group, but there was no concrete prize for an individual child. Children were allotted 15 min to perform the task because pilot testing indicated that children remained involved in the task throughout this time interval but did not complete many more cards after the interval had passed.

The precise instructions read to the children were as follows:

If it is all right with you, I am going to videotape you as you play a game. (The researcher then paused to obtain children’s verbal assent.) You will be working together to try to gain the most points. Children from several schools will be participating. The pair/group that gains the most points will win a plaque that lists the names of the winners. The way you win is to complete as many cards as possible in 15 minutes. Each card has a category and a letter on it, followed by 4 blank lines. To complete the card, you must write down 4 words that fit in the category that start with that letter.

Children then were shown the example of the category “birds” (see Figure 1).

After she presented the example, the researcher continued:

<table>
<thead>
<tr>
<th>Set</th>
<th>Category</th>
<th>Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Things in a kitchen</td>
<td>N, S, M, G, A, T, D, B</td>
</tr>
<tr>
<td></td>
<td>Things that are blue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Boys’ names</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things that are sticky</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruits &amp; vegetables</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Animals</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Girls’ names</td>
<td>R, S, L, C, P, D, E, H</td>
</tr>
<tr>
<td></td>
<td>Parts of the body</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things made of metal</td>
<td></td>
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<tr>
<td></td>
<td>Things that are red</td>
<td></td>
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<tr>
<td></td>
<td>Things you would find in a fridge</td>
<td></td>
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<tr>
<td></td>
<td>Trees, plants, &amp; herbs</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Things that are green</td>
<td>N, S, L, D, B, P, A, F</td>
</tr>
<tr>
<td></td>
<td>Cities, towns, &amp; countries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things in a bathroom</td>
<td></td>
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<tr>
<td></td>
<td>Things you eat</td>
<td></td>
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<tr>
<td></td>
<td>Things small enough to fit in your hand</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Music groups (e.g., pop groups)</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Things that are gray or silver</td>
<td>R, L, N, M, P, B, A, W</td>
</tr>
<tr>
<td></td>
<td>Things in a circus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things that are cold</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TV shows</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things that are round or rectangular</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Things that grow</td>
<td>T, S, R, M, C, D, E, F</td>
</tr>
<tr>
<td></td>
<td>Famous people</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things that are white</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Leisure activities</td>
<td></td>
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<tr>
<td></td>
<td>Girls’ names</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things you can buy in a supermarket</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Things that are blue</td>
<td>R, L, T, P, C, M, E, W</td>
</tr>
<tr>
<td></td>
<td>Things in a classroom</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things in the ocean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things you plug in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fruits &amp; vegetables</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things that make a sound</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Things that are green</td>
<td>S, L, T, D, B, C, A, G</td>
</tr>
<tr>
<td></td>
<td>Things found in a kitchen</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fictional characters (e.g., cartoon)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Things with tails</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cities, towns, &amp; countries</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5-letter words</td>
<td></td>
</tr>
</tbody>
</table>
Each card that is completed gives your Group 1 point. If the card is not completed, for example it has only 2 or 3 words on it, you do not get a point for it. The winning group will be the one with the highest number of completed cards. It does not matter how many words each of you gets. Your points will be given to your group as a whole, so all you get is one group score. Don’t worry about the spelling of the words as long as I can understand what you mean.

Following her explanation, the researcher posted on the wall the six categories for that particular dyad/group. Children were told they could discuss the six categories and how to organize themselves before beginning the actual task. No letters were provided so that the children could not begin prematurely. This preliminary discussion was permitted because it allowed the children to consider potential strategies. None of the children’s discussions lasted more than 5 min. After the children’s discussion ended, the researcher asked whether the children were prepared to begin. When they agreed, she then spread the 48 category cards on the floor, showed the children that each of the 6 categories could be identified by the color of the card on which it was printed, and told the children that they had 15 min to complete as many cards as possible. The researcher then filmed the children for 15 min. If a child asked her a question, then she responded as honestly as she could, though she did not provide any words to the children. Otherwise, she did not interact with the children.

After 15 min, the researcher announced that the children’s time was over and counted the number of completed cards with them. The researcher then congratulated the children on their performance, thanked them as a group for participating, and handed each child a brightly colored certificate of participation with the child’s name printed on it. Finally, she asked the children not to discuss the categories with others who had not yet participated and could benefit from advance knowledge of the task.

**Measures**

The total number of cards completed formed the first measure of the study. To ensure that cards were completed accurately, each completed card was examined for inaccuracies. None was considered serious enough to merit omission.

To analyze the dynamics of the dyads and groups, two behaviors were coded: writing on the cards and talking. Writing on the cards was chosen because this behavior seemed the most straightforward measure of effort. Although a child might not be able to generate four words that began with the same letter within a category, all 10-year-old children were capable of generating at least some words within each of the categories that began with specific letters. Recording the words was necessary for completing a card.

Talking was used as a measure of level of cooperation. Providing a missing word constituted the most direct form of cooperation. However, other forms of verbal cooperation occurred, including requests for help, recommendations about what cards to select, pronunciation of initial syllables as a way to initiate the generation of a word, questions about the number of cards completed and time remaining, and statements of encouragement. Because children were focused intently on the task, virtually none of the comments alluded to factors other than task completion. Hence, all instances of talking were included.

Because the children took time to settle into a routine, coding commenced after 7 min had passed and continued for 3 min. The 3 min were divided into 18 10-s blocks. Coders determined whether a child wrote on a card or talked to another child for each block during the 3-min interval.

One coder determined for every child whether he or she wrote on a card during each of the 18 blocks. For the purpose of reliability, a second coder rated 1 child in each dyad and 2 children in each group. Percentage of agreement was 92, with a kappa of .79. The scores for writing on the cards consisted of the total number of blocks spent writing on the cards for all members of the dyad/group combined as well as the number of blocks each individual child within the dyad/group spent writing on the cards. In addition, following the procedure of Charlesworth and Dzur (1987), within each dyad/group, children were ranked from highest to lowest on the basis of the number of blocks each spent writing on the cards. Ratios then were calculated between the child who wrote the most and the child who wrote

**Figure 1.** An example of the word generation task using eight cards from one category.
the second most. For the groups, ratios also were computed between the child who wrote the most and the children who wrote the third, fourth, and fifth most often.

A third coder determined whether talking occurred within each of the 18 blocks. Because talking was a highly reciprocal activity, only 1 child in each dyad was coded for talking and 2 randomly chosen children in each group. For the groups, if the child spoke to more than one child within a block, then all the individuals to whom the child spoke were recorded in the same block. For the purpose of reliability, a fourth coder rated 1 child in each dyad and 2 children in each group. For the dyads, percentage of agreement was 88, with a kappa of .74. For the groups, percentage of agreement was 92, with a kappa of .70. The number of blocks spent talking for the 2 children in the group were averaged to create one score per group. The scores for talking consisted of the number of blocks 1 individual spent talking in the dyads and the average number of blocks the 2 individuals spent talking in the groups. In addition, based on research by Seeley et al. (2003) demonstrating that women are more likely than men to focus on one individual within a group, the dyads of the groups were examined further by analyzing the maximum number of blocks a child spent talking to one other individual. The second highest number of blocks a child spent talking to a different individual was tabulated, and the second measure was subtracted from the first measure. For these latter measures, the scores for the 2 children within a group were averaged to form one group score.

Results

Analyses of the number of completed cards and number of blocks spent writing on the cards were computed using analyses of variance (ANOVAs) on the dependent variables, with sex and social structure as the independent variables. When interactions between sex and social structure were significant, Tukey’s follow-up test ($p < .05$) was used to compare means. For those analyses computed only for the groups, unless otherwise stated, two-tailed $t$ tests were conducted, with sex as the independent variable.

Number of Completed Cards

First, an ANOVA was run on the influence of sex and social structure on the number of completed cards during the 15 min allotted for the task. No sex differences were obtained on the number of completed cards ($F < 1$), indicating that interest in and difficulty level of the task were comparable for the two sexes. Because the groups contained 3 more children than the dyads, there was a large effect of social structure, $F(1, 24) = 14.81, p = .001$. Groups ($M = 13.14, SD = 3.51$) completed more cards than did dyads ($M = 8.29, SD = 3.52$).

However, the main effect of social structure was qualified by a significant Sex $\times$ Social Structure interaction, $F(1, 24) = 4.62, p < .05$. Follow-up tests demonstrated that boys performed more than twice as well in groups than in dyads, whereas girls’ performance did not differ in the two forms of social structure. Table 2 displays the mean results. Furthermore, Figure 2 depicts the number of completed cards for each dyad and group by sex and social structure (see Figure 2). As shown in the figure, there was little overlap between the male dyads and groups in number of completed cards, whereas female dyads and groups overlapped considerably. No sex differences were found in number of cards completed in dyads or in groups.

In summary, boys in groups outperformed boys in dyads as would be expected by the greater number of individuals who were present in the group to help complete the cards. Girls, however, did not profit from the greater number of individuals present in groups. Girls and boys did not differ in their performance in the two forms of social structure. Without more refined analyses, it is impossible to determine whether the interactions within dyads or within groups differed by sex. Consequently, following the procedures used by Charlesworth and Dzur (1987) and Seeley et al. (2003), several aspects of the dynamics of interaction in dyads and groups were examined.

Table 2

<table>
<thead>
<tr>
<th>Structure</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>Dyad</td>
<td>6.71</td>
<td>3.15</td>
</tr>
<tr>
<td>Group</td>
<td>14.29</td>
<td>2.63</td>
</tr>
<tr>
<td>Combined</td>
<td>10.50</td>
<td>4.82</td>
</tr>
</tbody>
</table>

Total Number of Blocks Spent Writing on the Cards

As a measure of effort expended, the number of blocks spent writing on the cards for the 3-min period was analyzed. An ANOVA was run to compare the total number of blocks children in the dyads and groups spent writing on the blocks by sex and social structure. No effect of sex was found, $F(1, 23) = 1.64, ns$, indicating the two sexes invested equal levels of energy writing on the cards. By definition, the total number of potential blocks in which a group could write (18 blocks $\times$ 5 children $= 90$) exceeded the total number of blocks in which a dyad could write (18 blocks $\times$ 2 children $= 36$), rendering the main effect of social structure highly significant, $F(1, 23) = 28.07, p < .001$.

Once again, however, the effect of social structure was qualified by a significant Sex $\times$ Social Structure interaction, $F(1, 23) = 10.82, p = .003$. Paralleling the interaction for number of completed cards, boys spent significantly more blocks writing on cards in groups ($M = 21.57, SD = 5.29$) than in dyads ($M = 8.14, SD = 3.76$), whereas girls did not differ in the number of blocks they spent writing on cards in groups ($M = 14.43, SD = 2.94$) and in dyads ($M = 11.29, SD = 3.86$). Additional analyses demonstrated that girls in groups wrote significantly less than boys in groups, but the two sexes did not differ in the number of blocks they spent writing in dyads.

Thus, both in terms of number of completed cards and effort expended to write on the cards, boys excelled in groups, whereas girls did not. The lack of enhanced performance in groups for girls rests partially on the lesser effort expended by girls as compared with boys measured by number of blocks spent writing on the cards. Task demands increased the probability that more cards would be completed and more blocks spent writing simply when more individuals are present. Thus, these analyses provide no evidence to indicate that male dyads underperformed relative to female dyads. Female groups clearly, however, underperformed relative to male groups in terms of amount of effort expended on the task.
Differences Between the Sexes in Number of Blocks Spent Writing on Cards in Dyads and in Groups

Following the analyses of Charlesworth and Dzur (1987), within each dyad and group, children were ranked from highest to lowest according to the number of blocks each spent writing on the cards. To facilitate identification, the child who wrote for the most blocks in the dyad or group was designated Writer 1, the child who wrote for the second most blocks was designated Writer 2, and so forth. Given that only 2 children participated in the dyads, references to Writer 3, Writer 4, and Writer 5 pertain only to the groups. The means for the writers are displayed in Table 3.

To compare sex differences in the effort expended on the task in both forms of social structures, an ANOVA, with sex and social structure as independent variables, was conducted first on the number of blocks spent writing for Writer 1. There were no significant effects of sex or social structure (Fs < 1), and the interaction between sex and social structure did not attain significance, F(1, 23) = 3.66, ns. No sex differences were found in the number of blocks spent writing for the child who wrote the most in either the dyads or groups.

The ANOVA then was repeated on the number of blocks spent writing for Writer 2. No effect of sex was found (F < 1). There was a significant effect of social structure, F(1, 23) = 12.56, p = .002, which was qualified by a significant Sex × Social Structure interaction, F(1, 23) = 12.56, p = .002. Follow-up tests demonstrated that, in dyads, Writer 2 girls wrote significantly more than Writer 2 boys, whereas in groups, Writer 2 boys wrote significantly more than Writer 2 girls. Furthermore, Writer 2 boys spent significantly more blocks writing in groups than in dyads. However, Writer 2 girls spent the same number of blocks writing in dyads as in groups.

Comparing the children who wrote the lesser amount in the dyads demonstrated that boys wrote for significantly fewer blocks than girls did. Thus, one of the boys in the dyads diminished his effort relative to a girl in the same position. In contrast, the reverse effect occurred in groups. Comparing the child who wrote the second to highest amount in the groups showed that girls wrote for significantly fewer blocks than boys. That is, the girl who wrote the second most in the groups diminished her efforts relative to the boy in the analogous position.

Because there were only 2 individuals in the dyads, further analyses were conducted only on groups. Using a t-test, the number of blocks spent writing for Writer 3 was compared for each boy and girl in the groups. As highlighted in Table 3, consistent with the findings for Writer 2 in the groups, Writer 3 boys spent significantly more blocks writing than Writer 3 girls, t(12) = 3.90, p = .002. No significant sex differences were found for the number of blocks spent writing for Writer 4 (t < 1) or Writer 5, t(12) = −1.44, ns. Neither Writer 4 nor Writer 5 devoted much time to writing on the cards.

Differences Between Writers Within the Dyads

In the dyads, 1 of the 2 boys appeared to withdraw from the task, whereas this was not the case for the girls. This should generate a less evenly distributed level of effort within male as opposed to female dyads. To compare sex differences in the ratio of effort expended by the 2 children in the dyads, the number of blocks that Writer 1 spent writing was divided by the number of blocks that Writer 2 spent writing. For the one male dyad and one female dyad in which Writer 2 wrote for zero blocks, the 0 was replaced by a 1 to allow computation of ratios. Using 2:1 as an indicator of a substantial difference in degree of energy expended on the task, the number of male and female dyads in which the ratio of the number of blocks of writing differed by at least 2:1 was compared. In six of the seven male dyads (86%), but only two of the seven female dyads (29%), the ratio between the number of blocks of writing for

Table 3
Mean Number of Blocks Spent Writing on Cards for Each Child by Sex and Social Structure

<table>
<thead>
<tr>
<th>Structure</th>
<th>Highest number of blocks (Writer 1)</th>
<th>Second highest number of blocks (Writer 2)</th>
<th>Third highest number of blocks (Writer 3)</th>
<th>Fourth highest number of blocks (Writer 4)</th>
<th>Fifth highest number of blocks (Writer 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dyad</td>
<td>M</td>
<td>SD</td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Males (n = 7)</td>
<td>6.14</td>
<td>2.73</td>
<td>2.00a</td>
<td>1.53</td>
<td></td>
</tr>
<tr>
<td>Females (n = 7)</td>
<td>7.29</td>
<td>1.74</td>
<td>4.00a</td>
<td>2.52</td>
<td></td>
</tr>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males (n = 7)</td>
<td>8.00</td>
<td>1.63</td>
<td>6.71a</td>
<td>1.50</td>
<td>4.86a</td>
</tr>
<tr>
<td>Females (n = 7)</td>
<td>6.14</td>
<td>1.86</td>
<td>4.00a</td>
<td>1.00</td>
<td>2.29a</td>
</tr>
</tbody>
</table>

Note. Means with different subscripts differ significantly. Given that only 2 children participated in the dyads, references to Writers 3, 4, and 5 pertain only to the groups. Means that do not share subscripts differ significantly at p < .05.
Writers 1 and 2 was at least as great as 2:1, a difference that was significant using Fisher’s exact test ($p = .05$). Thus, effort in male dyads was significantly less evenly distributed than in female dyads, as measured by number of blocks each spent writing.

**Differences Between Writers Within the Groups**

In the groups, the girls who wrote for the second and third highest number of blocks wrote significantly less than the boys in the analogous positions. In contrast to the dyads, this should generate a more uneven distribution of effort within female as opposed to male groups. To compare sex differences in the ratio of effort expended by the 2 children who wrote for the second and third to the highest number of blocks in the groups, the number of blocks that Writer 1 spent writing was divided first by the number of blocks that Writer 2 spent writing and then by the number of blocks that Writer 3 spent writing. Again, using 2:1 as an indicator of a substantial difference in degree of energy expended on the task, the number of female and male groups in which the ratio of number of blocks of writing differed by at least 2:1 was compared.

Dividing the number of blocks spent writing for Writer 1 by the number spent writing for Writer 2 yielded only one group (a female one) in which the ratio attained at least 2:1. Thus, no sex differences were found in the groups in the ratio of number of blocks spent writing for Writers 1 and 2. When the analysis was repeated for Writers 1 and 3, however, in six of the seven female groups (86%) but only two of the seven male dyads (29%), the ratio attained at least 2:1, a difference that was significant using Fisher’s exact test ($p = .05$). Thus, dividing the number of blocks spent writing for Writer 1 by the number of blocks spent writing for Writer 3 demonstrated that female groups were significantly more unevenly distributed in terms of effort expended than male groups.

Finally, for all female and male groups, the ratios between the number of blocks spent writing for Writers 1 and 4 exceeded 2. The analogous ratios between Writers 1 and 5 could not be computed because in only two groups (both female) did Writer 5 write at all.

**Total Number of Blocks Spent Talking**

As a second measure of the dynamics of social structure, the frequency of talking was compared in the dyads and groups. An ANOVA on number of blocks in which talking occurred was conducted. No significant effects of sex ($F < 1$), social structure, $F(1, 24) = 1.71, ns$, or interaction between sex and social structure, $F(1, 24) = 1.71, ns$, were found. On average, males and females in groups and dyads spent 9.89 ($SD = 3.67$) of 18 blocks talking to others. Thus, the number of blocks in which talking occurred was similar in male and female dyads and groups. Given that talking in dyads could be aimed only at one other child, no further analyses were conducted of dyads.

**Talking Directed Preferentially to One Individual Within the Groups**

Following the predictions of Seeley et al. (2003), the final analyses were used to examine whether females focused more than males on one other individual within a group. Consequently, one-tailed $t$ tests were performed comparing male and female groups on three related measures of talking. Because there were 2 target children who were coded in each group, for each measure, the 2 target children’s scores were averaged to provide one score per group. Table 4 displays the results of all the analyses.

First, the maximum number of blocks each target child spent talking to one other individual in the group was tabulated. Analyses demonstrated that the maximum number of blocks spent talking to one other individual was significantly higher for girls than for boys. Second, to correct for any differences in total number of blocks spent talking, the analysis was rerun with the proportion of the total number of blocks spent talking to the individual the target child addressed the most. To compute the proportion, the maximum number of blocks the target child addressed one other individual was divided by the total number of blocks the target child spent talking to all children in the group (a maximum of 18). The proportion of total blocks the target child spent talking to the individual he or she addressed the most was significantly higher for girls than for boys. Third, the difference was computed between the number of blocks the target child spent talking to the child to whom he or she spoke the most minus the number of blocks the target child spent talking to all children in the group in the analogous positions. In contrast to the dyads, this should generate a more uneven distribution of effort within female as opposed to male groups. To compare sex differences in the ratio of talking directed preferentially to one individual he or she addressed the most, the analysis was rerun with the maximum of 18). The proportion of total blocks the target child spent talking to the individual he or she addressed the most was significantly higher for girls than for boys. Third, the difference was computed between the number of blocks the target child spent talking to the child to whom he or she spoke the most minus the number of blocks the target child spent talking to all children in the group in the analogus positions. In contrast to the dyads, this should generate a more uneven distribution of effort within female as opposed to male groups. To compare sex differences in the ratio of talking directed preferentially to one individual he or she addressed the most, the analysis was rerun with the maximum of 18). The proportion of total blocks the target child spent talking to the individual he or she addressed the most was significantly higher for girls than for boys. Third, the difference was computed between the number of blocks the target child spent talking to the child to whom he or she spoke the most minus the number of blocks the target child spent talking to all children in the group.

**Qualitative Descriptions**

Qualitative descriptions of female and male groups suggest that girls may have a double agenda in groups and hence withdraw, relative to boys, from the task. Male groups functioned as a whole. While each boy wrote on his own card, he simultaneously provided help to and requested help from all other group members. Al-

Table 4

<table>
<thead>
<tr>
<th>Measure</th>
<th>Female ($n = 7$)</th>
<th>Male ($n = 7$)</th>
<th>$t(12)$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum number of blocks spent talking to one other individual</td>
<td>6.00 2.22</td>
<td>4.21 1.19</td>
<td>1.88</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Proportion of total number of blocks spent talking to individual talked to most frequently</td>
<td>0.63 0.20</td>
<td>0.49 0.05</td>
<td>1.84</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>Difference in number of blocks spent talking to 2 individuals talked to most frequently</td>
<td>3.64 2.59</td>
<td>1.71 1.85</td>
<td>1.79</td>
<td>&lt;.05</td>
</tr>
</tbody>
</table>
though one boy in each group did not write on the cards, this boy nevertheless maintained his group focus by requesting from and providing help to other group members.

By contrast, female groups did not operate as a whole but instead were composed of smaller factions. As in the male groups, in female groups, each girl always wrote on her own card. Unlike the male groups, however, in female groups, a girl was more likely to direct her requests to and obtain help from only one or two other members of her group. Thus, the group functioned as separate dyads or triads. Determining which group members to request help from and provide help to appeared to occupy the attention and efforts of many of the girls, particularly as membership in the subgroups often shifted. This distracted a girl from focusing all of her energy on the task.

Qualitative descriptions of male and female dyads also suggest differing processes. In dyads, over the course of the task, in six of the seven male dyads, one of the boys appeared to become increasingly frustrated with the task and hence diminished his efforts. To compensate for his frustration, the boy ceased writing, rose from the floor, and spent his time walking around his partner, who remained seated, generating and writing words. The frustrated boy, although theoretically attempting to help his partner by generating words and providing guidance, in practice halved the amount of effort that the dyad invested in the task, thereby diminishing the number of completed cards for the dyad. Not having a card in front of him, the frustrated boy often provided advice when none was needed or provided incorrect words. By default, the boy who continued generating and writing words became virtually the sole contributor to the task.

None of the female dyads adopted this strategy. In five female dyads, both of the girls generated and wrote words on their own cards and requested and provided help only when it was required. In two female dyads, the girls chose from the outset to sit side-by-side and focus together on a single card. In these two dyads, one girl took greater responsibility for writing on the card. In contrast to the male dyads, however, both girls focused on the card and generated appropriate words. Nonetheless, the two female dyads that adopted this strategy completed fewer cards than the other five female dyads in which both members of the dyad generated words and wrote on their own cards, requesting help only when it was necessary.

**Discussion**

Results demonstrated that same-sex dyads and groups consisting of familiar peers elicit differential reactions from males and females. Consistent with results from prior studies, boys withdrew more in one-on-one interactions, whereas girls withdrew more in groups. Effort in male dyads then became less evenly distributed than in female dyads, whereas effort in female groups became less evenly distributed than in male groups. This pattern of interaction permitted boys but not girls to capitalize on the greater numbers of individuals present in groups and increase their performance in groups relative to dyads. Girls more than boys focused on individuals within the groups, thereby partitioning groups into smaller factions. Critical to the validity of the task, no sex differences were found on overall performance, energy investment, or degree of cooperation. The task also differed from prior ones that relied on internal competition (e.g., Benenson et al., 2002, 2001; Charlesworth & Dzur, 1987). Despite use of a task that differed from those used in prior studies, findings were consistent with past results that males withdraw more than females in one-on-one interactions, whereas females withdraw more in groups. The same findings appear in adult conversations of human relations cases (Bales & Borgatta, 1955), in marital conflicts (Gottman & Levenson, 1992), and in zero-sum games or activities of preschool and primary schoolchildren (Benenson et al., 2002, 2001; Charlesworth & Dzur, 1987).

These results then provide an explanation for why Waldrop and Halverson (1975) found that the most sociable children at 2.5 years differed by sex at 7.5 years in the type of social structure they preferred: Sociable boys preferred groups, whereas sociable girls preferred one-on-one interactions. Social behavior appears to be facilitated for males in groups and for females in one-on-one interactions.

Part of the explanation for females' withdrawal from groups may reside in the double agenda of girls' groups. Girls' greater focus on an individual within a group resembles recent findings by Seeley et al. (2003) with adults, in which they concluded that women view groups as "a circle of friends," whereas men treat groups as a source of collective identity. If girls are more likely than boys to focus on an individual within a group, then groups of girls must work not only on the task but also on selecting a partner. Relative to boys who are less concerned with finding a specific partner within a group and consequently freer to focus their energy solely on the task, girls must juggle two goals simultaneously.

Widespread conclusions, then, that females focus more on relationships and males on tasks (for a review, see Aries, 1996) may be biased because they include primarily experiments involving groups. In groups, females may be viewed as more socially oriented than males who are characterized as more task oriented because females invest more than males in finding a partner with whom to interact. Less time and energy, then, remains for females to work on a task. Conversely, males in groups may focus as much as females on social interactions, but they direct their behavior toward the group as a whole rather than to individuals. Both these forces may lead researchers to mischaracterize females as more socially oriented and males as more task oriented.

If a group of girls or women should include individuals less concerned with choice of partners, then the individuals likely could devote more attention to the task. Identifying the characteristics that distinguish females who are more likely to invest in the task as opposed to choosing partners remains a goal for future research.

Why males expend effort less evenly in one-on-one interactions compared with females also remains an important question for future study. Dyads most likely are less able than larger groups to absorb competition because of their lack of anonymity, mediators, allies, alternate partners, as well as their inability to engender loyalty to or identify with a larger group (Bales & Borgatta, 1955; Benenson et al., 2002, 2001; de Waal, 1989; Maccoby, 1986; Slater, 1958; Thorne & Luria, 1986). Given that, compared with females, males enjoy overt competition more (Roy & Benenson, 2002; for a review, see Maccoby, 1998), one-on-one interactions may generate particular discomfort. In the present study, in both the dyads and groups, several boys spontaneously compared the number of cards each had completed. If boys were more likely than girls to compete to complete the cards, then this likely would have elicited more negative emotions in one-on-one interactions than in
groups. The less skilled member of the dyad, then, may have chosen to diminish his personal investment in the task in order to save face. Although less skilled boys in groups may also have reduced their efforts, it was less apparent and had less impact on the group’s performance.

Results of this study in combination with previous findings may provide useful insights for the design of settings for the two sexes. Dyadic and group interaction likely provide differential benefits and costs to the two sexes when they are interacting with same-sex, familiar peers. Given the greater pleasure they derive from overt competition (for a review, see Maccoby, 1998; Roy & Benenson, 2002), males may derive more benefits from groups as opposed to dyadic structures. Females who enjoy more intimate conversations (for a review, see Buhrmester & Prager, 1995) may be able to find partners across many types of social structures, as groups may be partitioned into individual friendships (Seeley et al., 2003). When completing tasks, however, the presence of many other females may distract a female as she focuses on finding a partner with whom to establish a more intimate relationship. Depending on the goals of a setting, sex and social structure may be used to regulate distribution of task efforts in same-sex interactions with peers.

Differential accumulation of experience in groups and dyads may account partially for sex differences in responses to both one-on-one interactions and groups. Given males spend more time in groups and females in one-on-one interactions (for reviews, see Belle, 1989; Cairns et al., 1998), this may explain males’ and females’ propensities to withdraw more from the social structure with which they are less familiar. Experience alone, however, may not account fully for the differences obtained in this study. Evolved algorithms may attract males to groups and females to individuals. Recent research suggests that as early as 6 months of age, males may be more attracted than females to groups (Benenson, Duggan, & Markovits, 2004). Many scenarios could be imagined in which in the ancestral past, groups afforded more benefits to males than to females. Male coalitionary aggression provides one obvious example (Wrangham, 1999). Likewise, a focus on the individual may have enhanced the reproductive success of females more than males, as females hold more responsibility than males for the survival of their children (Campbell, 1999). Innately programmed algorithms combined with sex-typed socialization would augment these effects.

How the two sexes accumulate differential experience in one-on-one interactions versus groups also deserves careful developmental investigation. Males’ greater pleasure in overt competition (for a review, see Maccoby, 1998; Roy & Benenson, 2002) or females’ greater interest in the exchange of intimate information (for a review, see Buhrmester & Prager, 1995) may channel males and females to select continually the social structure most conducive, and least aversive, to their preferred style of interaction. Alternatively, external agents, such as parents or peers, may steer the two sexes toward differing forms of social structure. An understanding of these forces must form the basis for future investigations.

The results of the present study are limited entirely to dyads and groups composed of unrelated, same-sex, familiar individuals of the same age. In mixed-sex interactions, across diverse social structures and tasks, at all ages males derive more benefits than females (for a review, see Aries, 1996). For example, when mixed-sex preschool groups of 4 children competed for access to a movie viewer, boys attained more viewing time than girls did (Charlesworth & Lafreniere, 1983), unlike when only same-sex children participated (Charlesworth & Dzur, 1987).

Although few studies compare familiar versus unfamiliar individuals’ social responses, two studies suggest that girls are more cooperative in unfamiliar than in familiar groups. When unfamiliar, same-sex primary schoolchildren participated in the movie viewer task in groups, girls cooperated with one another and gained more viewing time than boys did. Unlike in familiar male groups, unfamiliar boys competed so strongly that they prevented one another from viewing the cartoons (Green, Cillessen, Berthelsen, Irving, & Catherwood, 2003). Likewise, groups of unfamiliar girls behave more cooperatively toward a girl experiencing social difficulties than groups of familiar girls (Gazelle et al., 2005).

The ways in which children who vary in age and relatedness respond on the basis of their sex to differing forms of social structure also remains relatively unknown. Cross-cultural research suggests that girls are more likely than boys to spend time with younger and older siblings, whereas boys spend more time with unrelated peers of differing ages (for reviews, see Schlegel & Barry, 1991; Whiting & Edwards, 1988). Understanding the influence of age, sex, relatedness, and familiarity in differing forms of social structure should illuminate greatly fundamental patterns of human social behavior.

The results of the present study apply only to individuals with characteristics that resemble those of the present participants in terms of sex, age, familiarity, and kinship. Likewise, the effects of the present study require replication with other tasks and settings. Because past research with children has focused primarily on limited-resource, competitive tasks (Benenson et al., 2002, 2001; Charlesworth & Dzur, 1987), in this study, a task that encouraged cooperation was chosen. The task further was designed so that group interaction should have enhanced performance simply because more individuals were available to complete the cards. Had the design favored dyadic performance, the results may have differed. All aspects of the task and setting, including the presence of a female researcher, time interval, selection of categories, group size, provision of a reward, lack of a prearranged seating arrangement, choice of writing on the cards as a measure of investment, and talking as a measure of cooperation, may have influenced the findings. Although the task was designed to mimic a number of aspects of natural group processes (Brown, 2000; Ridley, 1996), generalization of the results can occur only through replication with different tasks in diverse settings.

A number of features of the present study likely influenced its results. Had a larger group size been used, boys’ groups, too, may have fissioned into smaller ones. Removal of the reward for winning may have diminished intergroup competition and engagement in the task and the cohesiveness of boys’ groups. In contrast, provision of concrete individual rewards may have enhanced competition, possibly increasing the magnitude of sex differences in both the dyads and groups. The cohesiveness of girls’ groups may have been augmented had a formal seating arrangement with instructions from a teacher to cooperate been included. A different task, such as one that focused on helping an external individual overcome problems, may have diminished the cohesiveness of female dyads and increased that of female groups.
As a final caveat, results cannot be generalized to research on close friendships. Clearly, boys and men can establish long-standing friendships that likely override uneven distributions of effort found in the present study or at least compensate for them in some way. Likewise, girls and women may develop a group of close friends that similarly correct uneven distributions of effort or compensate for them. Nevertheless, this study suggests that because of less even distributions of effort, isolated male friendship dyads and groups of female friends will require more effort to maintain and hence materialize less frequently. Male friendships embedded within a larger group structure and female friendships that are freestanding reflect more common forms of friendship (Rubin, 1985; Tiger, 1969).

In summary, this study provides evidence that the two sexes respond differently to same-sex one-on-one interactions and groups. Whereas males withdraw from a task more in one-on-one interactions than in groups, females withdraw from a task more in groups than in one-on-one interactions. This produces a less even distribution of effort in male versus female dyads and in female versus male groups. It also permitted males but not females to profit from the presence of additional individuals. Before conclusions can be drawn or predictions proposed concerning sex differences in task investment, communal orientation, or hierarchical organization, social structure deserves consideration. More detailed investigation into the emotional responses and behaviors of males and females as they interact in each form of social structure is warranted. A more tailed investigation into the emotional responses and behaviors of males and females as they interact in each form of social structure with individuals from varying sex, age, and kinship classes who differ in degree of familiarity should enhance understanding of human sex differences in complex social responses.

References
collective attachment to groups. *Group Processes and Intergroup Relations*, 6, 251–263.