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Same-Sex Compatibility: Comparing Social Relations in Same- and Mixed-Gender Groupings of Young Preschoolers

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ABSTRACT

Same-sex compatibility: Comparing social relations in same- and mixed-gender groupings of young preschoolers

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Children spend up to 80% of play time in gender-segregated play groups by the time they enter elementary school. The present study attempted to explore possible indications of same-sex compatibility in subjects younger than the age in which gender segregation is typically detected.

To see if same-gender groupings are more compatible than mixed-gender groupings, 55 children with a mean age of 33 months from five classes in two nursery schools were observed during free play. Group composition (e.g. same-gender dyads, mixed-gender groups), and social engagement (e.g. parallel play, interaction) occurring in a given group were noted.

After it was determined that gender-segregated play was not the predominant mode of play in these subjects, the social relations occurring in same-gender vs. mixed-gender groupings were compared for the 38 subjects who participated sufficiently in all the group compositions. There were no significant differences in the rate of parallel play occurring in same-gender compared to mixed-gender groupings. Significantly more watching was found to occur in mixed- than in same-gender groupings, and in groups than in dyads.

Most importantly, there were significantly more episodes of social interaction in same-gender dyads than in mixed-gender dyads. This higher rate of interaction occurred even when the effects of same-gender dyadic relationships were taken into account.

These results were considered to support the idea of same-sex compatibility. It is suggested that this compatibility may be promoted to a certain extent by individual developmental factors, such as gender identity, which propel children towards same-gender peer groupings which then become rewarding environments partly because they foster further development of gender identity. However, this idea of same-sex compatibility was only partially supported since higher rates of interaction were seen in dyads but not in groups. It is discussed that the ability to interact in a group situation may develop after the ability to interact in a dyadic situation. Thus, same-gender interaction beyond the dyadic situation may occur later in development. Gradually, gender segregated groups may become the predominant context of social interaction.

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A ubiquitous phenomenon of early childhood is the growth of same-sex association, resulting by the early elementary school years in sex-cleaved play groups which endure until adolescence (Ellis, Rogoff, & Cramer, 1981; Hartup, 1983; Maccoby & Jacklin, 1987)[1]. The phenomenon of gender segregation is likely to develop in situations where there are a sufficient number of children of similar age and both sexes available, and where children are free to choose their playmates (Maccoby & Jacklin, 1987; see Harkness & Super (1985), and Omark, Omark, & Edelman (1975) for cross-cultural studies).

By about age 4, the frequency of play in same-gender groups becomes higher than chance, and by the early elementary school years, up to 80% of free play occurs in same-gender groups (e.g. Maccoby & Jacklin, 1987). Once formed, gender segregated groups do not only differ in sex composition: different "cultures" develop, the ultimate consequence of which may be acquisition of sex-differentiated life skills (Etaugh, 1983; Huston, 1985; Maccoby & Jacklin, 1987).

Though much is known about the developmental course of gender segregation, little is understood about its origins or about its connection to other aspects of sex-role development. A speculation presented many years ago

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[1]For citations and analyses of studies documenting the occurrence and increase with age of gender segregation, the reader is referred, in particular, to reviews by Hartup (1983), Lockheed and Klein (1985) and Maccoby and Jacklin (1987).

(Goodenough, 1934), which has recently been revived (Jacklin & Maccoby, 1978; La Freniere, Strayer & Gauthier, 1984) is that boys and girls may segregate into same-gender groups because the sexes may have different behavioral repertoires, or different styles of social participation. Jacklin and Maccoby (1978) termed this speculation 'behavioral compatibility.'

Several researchers have attempted to define this elusive notion of compatibility and to determine what is similar about same-sex children, and/or how boys and girls differ in a way that encourages the development of sex segregation. The present thesis has the same purpose, but differs from much research in that it emphasizes the role of group process in the origin of gender segregation. This thesis considers within-sex social compatibility to be, at the outset, not so much a characteristic of individuals as an emergent property of same-gender groups. In other words, in this thesis "behavioral compatibility" is defined at the group level.

"Individual" Explanations of Same-Sex Behavioral Compatibility

Gender identity. Before explaining further the idea of gender segregation originating as a group process, it seems necessary to discuss some of the "individually" oriented explanations of behavioral compatibility. One explanation is that as children develop gender identity, that is, an

understanding of which sex they belong to, they begin to modulate their behavior and their preferences in accordance with their increasingly sophisticated notions of what is appropriate for their gender. They choose to play with children "like me," and to perform sex-appropriate activities (e.g. Kohlberg, 1966).

There is evidence that same-gender peer preferences and gender identity are related. The relevance of much of this evidence to the present study is limited however because generally pictorial or other non-behavior-based measures of peer preference have been used (e.g. Emmerich & Shepard, 1984; Martin & Little, 1987). However, several observational studies provide at least partial support that children with a rudimentary gender identity play with same-gender peers more frequently than children without gender identity do (Fagot, 1985b; Fagot, Leinbach, & Hagan, 1986; Smetana & Letourneau, 1984). The latter two studies controlled for the effect of age. The Smetana and Letourneau study found an effect of gender identity only for girls. Nevertheless, it has been argued that sex-typed development is multidimensional and that the domain of cognitions about gender (such as gender identity) can only partly explain the behavioral domain of gender-based social relationships (e.g. sex-segregated associations) (Huston, 1983, 1985).

The role of toys. Another explanation for behavioral

compatibility focuses on the role toys may play in facilitating sex segregation. This suggestion is that children, exposed primarily to sex-typed toys from infancy (e.g. Rheingold & Cook, 1975; also see Huston, 1983), naturally gravitate to familiar, preferred toys in the preschool (Rubin, Fein, & Vandenberg, 1983). There they meet others of their sex with similar interests and thus same-gender alliances are reinforced. In other words, the different activity repertoires of boys and girls encourage gender segregation.

Although there is evidence that young children motivate each other to engage in sex-typed activities (e.g. Fagot, 1977, 1985a; Serbin, Connor, Burchardt, & Citron, 1979), this socialization phenomenon does not quite explain how toys may provide a context for same-gender play. There is some indirect evidence to support the contextual role of toys. Observations made in an "open" vs. a traditional preschool, with the latter having conventional sex-typed activities available, found less gender segregated play, and more mixed-gender play in the "open" school (Bianchi & Bakeman, 1978). However, the study did not explicitly examine how segregation varies with the sex-typing of toys. Further, the types of school differed on other dimensions besides availability of sex-typed toys. In particular, teachers in more "open" schools initiated and were involved in a great deal of mixed-sex play (Bianchi & Bakeman, 1983).

Other studies have found that same-sex-typed toy play is uncorrelated with same-gender peer play in four-year-old preschoolers (Eisenberg, Tryon & Cameron,1984; Maccoby & Jacklin, 1987). It has also been found that toddlers display more positive responses to same-gender peers than to other-gender peers independent of the sex-typing of the activity the peer is engaged in (Fagot, 1985a). Therefore, though toys certainly influence peer interactions, other mechanisms besides sex-typed activity preferences may account for same-sex behavioral compatibility, and, in turn, for gender segregation, particularly at the young preschool age.

Sex differences in behavior. Another suggestion is that boys and girls develop different social styles, and that these differing social styles lead to more complementary interactions with same-gender partners. Indeed, some sex differences in social behaviors have been found. From an early age, boys have often been found to be more aggressive and to engage in more rough and tumble play than girls (e.g. Blurton-Jones, 1972; D'Andrade, 1966; DiPietro, 1981; Maccoby & Jacklin, 1974, 1980, 1987; Omark, Omark, & Edelman, 1975; Smith & Green, 1975), and in some studies to be more active (Eaton & Keats, 1982; Maccoby & Jacklin, 1987), although not in others (Halverson & Waldrop, 1973). Research has also found preschool-aged boys to be more "dominant" than girls: for example, boys try to

verbally influence peers more (Serbin, Sprakfin, Elman & Doyle, 1982), are perceived as "tougher" by their peers (Omark, Omark & Edelman, 1975), are able to gain greater access than girls to a coveted toy both are competing for (Powlishta & Maccoby, 1987), and are more successful than girls in their assertive bids (Lloyd & Smith, 1986).

Though intrusive behaviors do not occur frequently in toddlers and preschoolers (e.g. Eisenberg, Tryon & Cameron, 1984; Mueller, 1979), they would clearly be salient in social interactions. Therefore, sex differences in assertive behaviors could certainly contribute to social incompatibility between the sexes. Boys may prefer or be more comfortable with these behaviors than girls and may naturally gravitate towards other children (often boys) with similar social styles. Girls may be less comfortable with these potentially intrusive behaviors, and may avoid children (often boys) with this type of social style (Haskett, 1971).

However, the most frequently occurring categories of social behaviors at the young preschool age, when gender segregation begins, are behaviors such as watching, parallel and cooperative or interactive play (e.g. Parten, 1932, Roper & Hinde, 1978; Rubin, Maioni & Hornung, 1976). These do not show sex differences (e.g. Eckerman, Whatley, & Kutz, 1975; Holmberg, 1980). Researchers have not found young boys and girls to differ in overall amount of sociability,

in quality of interactions, or in the possible ranges of expression, such as touching, watching, approaching, object exchanges, object struggles, or cooperative play (e.g. Eckerman et al, 1975; Maccoby & Jacklin, 1987).

Both boys and girls establish a basic "repertoire" of social behaviors around the end of their first year of life (Eckerman, Whatley & Kutz, 1975; Holmberg, 1980; Mueller & Vandell, 1979). For both sexes, relations become considerably more peer-focused, complex, and variable at the beginning of the preschool period; at around 2 - 2 1/2 (e.g. Eckerman et al, 1975; Holmberg, 1980; Lamb, 1978; Nadel-Brulfert & Baudonniere, 1982). Thus, though assertive behaviors may play a role in separating the sexes, most of the daily interactions of boys and girls may not actually differ. Therefore, sex differences in social styles can only partly contribute to same-sex social compatibility.

A "Group" Explanation of Same-Sex Behavioral Compatibility

"Individual" explanations of same-sex behavioral compatibility seem incomplete. Neither development of gender identity nor familiarity with and preference for sex-typed toys can entirely explain the development of gender segregation. Further, boys and girls have similar interaction styles at this age. Nevertheless, social style seems an important clue to understanding same-sex social compatibility.

This thesis considers interaction style to be a key to

gender segregation. However, it is the interaction styles of groups, rather than individuals which must be explored. This idea springs from suggestions by Maccoby and Jacklin in their chapter on gender segregation (1987).

As part of a longitudinal study (the Stanford Longitudinal Project), Maccoby and Jacklin (1987) investigated gender segregation in cohorts of children of approximately 4 1/2 years of age in nursery school. One of their goals was to determine whether the tendency to play in sex-segregated groups was a stable characteristic which varied among individual children.

They observed the children during free play and recorded, among other things, the number of intervals of either parallel or interactive play with same-gender partners, opposite-gender partners (i.e. groups consisting only of children of the opposite sex, excluding the child under study), and mixed-gender partners (i.e. groups consisting of children of the opposite gender and at least one other same-gender partner).

To examine whether same-gender playmate choice was a stable variable characterizing individuals, a subsample of 12 children (7 boys, 5 girls) were observed twice in one week. The one-week stability coefficient was low and nonsignificant. To quote from Jacklin and Maccoby (1987), this means that

> on any given day, a snapshot of the play activity in a nursery school would

> show...many children playing in same-sex groups; on another day, a snapshot would show the same thing. But on the two days, it would seldom be the same children... The implication is that gender segregation at this age is more a group phenomenon that something that reflects the dispositions of certain children more than other children (1987, sec b, pp. 14-15).

Although they acknowledge that their stability sample was small, and consisted only of one repeated observation, Maccoby and Jacklin (1987) do point out that this data was sufficient to yield high and significant stability coefficients for other behaviors of individuals: activity level, rough and tumble play, and sociability. Hence, there must be some validity to the conclusion that these latter behaviors seem stable characteristics of the play of individual children, while same-gender playmate choice is not.

The consideration of gender segregation as a group phenomenon is a most important one. Maccoby and Jacklin (1987) did not attempt to explain how this same-sex group compatibility may operate behaviorally. The present study attempts to do so. It is suggested that in more compatible groups, in this case, same-gender groups, proximal social behaviors will be more frequent than in less compatible groups, that is, mixed-gender groups. Proximal behaviors are those in which children are engaged with each other in interactive social exchanges, such as sharing, offering, game-playing, and aggressing. More distal social behaviors

are those in which children are not actually interacting with each other. For example, in parallel play, children are near each other and occupied with similar activities but do not in fact interact.

It seems that social proximity would be reinforcing and thus children would be motivated to seek it out. Thus, a cycle is envisioned in which more compatible groups have more proximal interactions which are rewarding thus leading to greater compatibility thus leading to more proximal interactions etc.

Partner influence in interaction. There is very little research on gender as a group process factor affecting social interactions. However, other research considered from this "group behavioral compatibility" viewpoint may shed some light on the subject. Research in other areas of social relations has clearly demonstrated that social behaviors do not occur in a vacuum. Although many investigators have focused on the development of social behaviors within individual children, an important distinction has been made by other authors between social behaviors expressed by individuals, and social interaction occurring in pairs or groups of children (e.g. Mueller, 1979). The behavior of one person affects the subsequent behavior of the other, and will depend, in part, on the "degree of reciprocity" (Holmberg, 1980) inherent in a pair or group of children. Any child with sufficiently developed

social capacities will have the potential to engage in a range of social acts. The expression of social behaviors, however, may depend greatly on situational variables, particularly related to the partner in the interaction.

Knowledge of the context of the occurrence of social behaviors is vital not only to illuminate the situational facilitators of social associations, but also because there is a reciprocal determinism (Bandura, 1978) between social interaction and social skills. From the beginning of social development, social skills not only influence social interactions; social interactions also help to create social skills (Becker, 1977; Mueller, 1979). In other words, contexts provide a socializing function.

There is a body of literature, as briefly reviewed below, showing that there are interpersonal variables beyond the individual, embedded in the interaction context, which serve as potent controls of the social behaviors emitted. There are many studies on mother-infant interaction which have shown the effect of these interpersonal or "intragroup" factors on interactions. One study showed, for example, that the absolute amount of infant engagement with both objects and a person concurrently depended on who they were with. There was more "joint engagement" when infants aged 6 to 18 months were with mothers than when with peers (Bakeman & Adamson, 1984).

Similarly, Holmberg (1980) found that children younger

than 24 months had significantly higher rates of interactions when they were paired with teachers than when with peers. Easterbrooks and Lamb (1979), and Rubenstein and Howes (1976) found similar effects. Other studies have shown that infants and toddlers engage in higher levels of social interaction with older children than with same-age peers (Goldman, 1976; Lougee, Grueneich, & Hartup, 1977). Prior peer group experience and familiarity with peers have also been shown to affect level of social interaction in toddlers and preschoolers (Harper & Huie, 1985; Roopnarine & Field, 1983). Charlesworth and La Freniere (1983) found that groups consisting of friends were able to cooperate to utilize a resource more than groups with no friends. Eaton and Keats (1982) found that triads of children were more active than were individual children.

Gender as a "group" variable. It is logical to consider, then, that gender may also play a role in children's peer interactions as a social or "group" variable: a variable beyond the individual. Little attention has been paid to sex as a variable affecting social interactions. This is particularly striking given the numerous studies on sex differences and sex-typing. Typically, a study which examines social relations in pairs of children (e.g. Eckerman et al, 1975) may analyze for sex differences (that is, for mean differences between the social behaviors of boys and girls). It will not, however,

analyze the breakdown of these behaviors by gender-of-dyad (i.e. same or mixed), much less report the number of each kind of dyad.

Possibly this inadvertent neglect has been due to the intensive investigations, characteristic of traditional sex-role research, on the contributions of biological, environmental, and, recently, cognitive factors to the development of sex differences in social and other behaviors. In other words, possibly because knowledge about mean sex differences has been pursued, gender as an interpersonal variable affecting social interactions has been overlooked.

Some discussion of the relevant observational literature which has recently emerged, although often without the explicit articulation of this interpersonal perspective about sex, may help clarify this concept. In observing groups of 4 unacquainted toddlers, Brooks-Gunn and Lewis (1979) found that infants, particularly females, looked longer at same-gender peers than at opposite-gender peers. There were no effects of gender for other social behaviors such as touching, or toy taking. Wasserman and Stern (1978) found that when children three to five years of age were asked to approach a peer, they stopped farther from opposite-gender than same-gender peers, and oriented their bodies farther away from opposite-gender than same-gender peers. Strayer and colleagues (La Freniere, Strayer &

Gauthier, 1984; Strayer & Pilon, 1985), observing 1-6 year olds in free play over a period of two years in daycare, found that by 2 years of age girls were directing 2/3 of their affiliative acts towards other girls. Boys did not direct significantly more acts to other boys until the age of 3 (La Freniere et al, 1984). Both boys and girls directed more agonistic acts towards other-gender peers than to same-gender peers at ages 1 and 2. By 3, both affiliative and agonistic acts, that is, virtually all social behaviors, were directed mostly towards same-gender peers (Strayer & Pilon, 1985).

In a more fine-grained analysis, Fagot and Hagan (1985) observed 1 1/2 - 3 year olds during free play, and found that boys aggressed against other boys twice as often as against girls, while girls were almost equal in allocation of aggression to boys and girls. Children of both sexes were likely to ignore the aggression of girls and to respond to the aggression of boys.

These studies, taken together, indicate that gender influences group interactions, independent of any differences between behaviors of boys and girls as individuals. To determine the effects of gender as a social group factor, children's relations across differently composed groups would have to be compared. In other words, it would be important to examine whether, despite a lack of mean sex differences in amount of sociability, children may express

their sociability differently depending on who they are with: same- or opposite-gender playmates.

Same- vs. mixed-gender interaction. There have been four studies to date in which researchers systematically varied the gender composition of groups and examined subsequent social interaction. All were laboratory studies which compared interactions between same- and mixed-gender dyads of children.

Langlois, Gottfried, and Seay (1973) examined the amount of social behavior in 2 male dyads, 2 female dyads, and 4 mixed-gender dyads of 3-year-old children from the same classroom. They found that mixed-gender and girl dyads exhibited approximately the same level of talking, smiling, and body contact: a level significantly higher than in the boy dyads. Thus, they found a significant effect of gender on social interactions, such that dyads containing at least one girl had higher levels of certain social behaviors than dyads containing no girl. They also looked at several groups of 5-year-olds, and found that at this age both sexes were more socially active when with a same-gender partner.

In a more recent study, Jacklin and Maccoby (1978) observed the social interactions of 12 girl pairs, 12 boy pairs, and 21 mixed-gender pairs of previously unacquainted 2 1/2 year olds. They found higher rates of social behavior, such as proximity between children, imitation, and object struggles, in same-gender pairs than in mixed-gender

pairs. Both boys and girls were more likely to cry or remain close to their mothers when paired with a boy: this effect was much stronger in mixed-gender dyads. Thus, the effect of gender found by Jacklin and Maccoby was that higher rates of social behavior occurred in same-gender dyads than in mixed-gender dyads. In other words, same-sex compatibility was found.

Kaplan and McCornack (1982) observed social interactions of 48 children at two age levels (one with a mean of 44 months, one with a mean of 60 months) in a repeated measures design. Children were paired once with a same-gender peer, and once with an opposite-gender peer, with order of pairing randomly determined. Children were paired with peers from their preschool class, in other words, familiar peers. They found that children tended to maintain proximity, talk, and play with similar toys more with same-gender partners than with opposite-gender partners. Younger dyads did not significantly differ from older dyads.

Finally, Lloyd and Smith (1986) studied sixty pairs of children from 19 to 42 months of age, grouped into four same-age levels. These pairs were from the same nurseries. Within each age group, there were five boy-boy, five girl-girl and five boy-girl pairs. Pairs played together for one six-minute free-play session in a laboratory setting. They found that total social behavior (categories were based on

those of Jacklin & Maccoby, 1978) occurred more frequently in same-gender dyads than in mixed-gender dyads, except in the dyads comprised of three to three-and-a-half year old boys where it was more frequent in mixed pairs. When subcategories of social behavior were analyzed, a different pattern emerged. Mixed pairs engaged in more prosocial behavior than same-gender pairs. Assertion and withdrawal behaviors did not show clear patterns with respect to gender of dyad.

Jacklin and Maccoby (1978) and Kaplan and McCornack (1982) found higher rates of social interaction in same-gender dyads of young preschoolers, whereas Langlois et al (1973) found higher rates of social interaction in young dyads containing a girl. Lloyd and Smith (1986) found higher rates of total social behavior in same-gender dyads, except for the oldest boys, but higher rates of prosocial behavior in mixed-gender pairs.

These studies examined some similar and some differing social behaviors, so it is unclear whether measurement of different social behaviors may in part explain the discrepancy. Lloyd and Smith (1986) based their categories on those of Jacklin and Maccoby (1978). They suggested that total social behavior may have been more common for three- to three-and-a-half year-old boys in mixed-gender pairs because girls of that age are more verbally advanced and therefore more interesting. It is puzzling that the "boys

with girls" cell should have a different mean from the "girls with boys" cell (the latter showing low levels of social behavior). It is not clear how or why these two cells differ. At any rate, except for the oldest boys, the results of total social behavior are consistent in three of four studies.

Lloyd and Smith (1986) had no clear explanation for their finding that prosocial behavior occurred more frequently in mixed-gender pairs. Their finding is inconsistent with the suggestions of the present study. With respect to design, the Langlois et al (1973) study may be less valid than the other three in part because of its small sample size. The Jacklin and Maccoby (1978) study was the most statistically sound: the sample size was the largest, and their data were analyzed with a correction for correlated scores (see Kraemer & Jacklin, 1979).

These studies substantially add to the literature about gender as a group variable and gender segregation as a group phenomenon in social interactions of young children. They suggest that same-gender groups may be more compatible than mixed-gender groups. However, these were laboratory studies using only pairs of children, and they therefore may not reflect what goes on in a natural play setting. Further, children were observed at only one point of time in the studies by Jacklin and Maccoby (1978) and Lloyd and Smith (1986), and only twice in the Langlois et al (1973) study.

In the Kaplan and McCornack (1982) study, children were observed once with a same-gender peer, and once with an opposite-gender peer.

There have also been two naturalistic studies which examined the relationship between group composition and social interaction. Phinney and Rotheram (1982) examined social overtures in same vs. cross-gender pairs as these occurred during the free play of three- to five-year-olds. Like Strayer and colleagues (La Freniere, Strayer & Gauthier, 1984; Strayer & Pilon, 1985), Phinney and Rotheram found children to direct significantly more overtures to same- than to opposite-gender partners.

More importantly, they compared types of overtures occurring in boy-to-boy, boy-to-girl, girl-to-girl, and girl-to-boy pairs. They found six types of overtures to differ significantly among gender-pairings: imperative, nonverbal joining in, physical aggression, offer, information statement, and challenge. Unfortunately, because they used chi-square analyses with social overture as the unit of analysis rather than, for example repeated measures analysis of variance with child as the unit of analysis, they were not able to clearly judge which dyadic compositions (e.g. boy-to-girl, girl-to-girl) differed significantly in overture strategies. For example, one can see from their figures that there were relatively more imperative overtures from boys to girls than from boys to

boys, but they could not determine whether these pairs differed significantly from each other (or from other pairs).

Phinney and Rotheram's (1982) study also addressed the issue of compatibility of gender pairs in that they looked at rates of overture successes in different gender-pairings. They found no significant relationship between success of outcome and gender pairing (i.e. dyadic composition). They did not, however, report chance rate of success in each gender pairing, information which would have made their results more meaningful. Despite its limitations, this interesting study does demonstrate the interpersonal influence of gender.

Urberg and Kaplan (1989) observed children between the ages of 32 to 62 months in a daycare center. Over a two-month period they observed children fifty times each and examined the relationship between social engagement and group composition. They used chi-square analyses to measure the relationship between social episode (two kinds of parallel vs. four kinds of interactive) and group composition with social episode as the unit of measure. They found that the parallel play categories had more than the expected number of sex-heterogenous groupings, while three of the four interactive categories had more than the expected number of same-gender groupings.

The study by Urberg and Kaplan (1989), like the study

by Phinney & Rotheram emphasizes the importance of gender as a group phenomenon. It also supports the idea that same-gender groupings may be compatible. However, it did not directly compare same- and mixed-gender groupings.

Size of group. Another aspect of group relations which may be relevant to the development of gender segregation is the size of a group. Although social psychologists have extensively studied different aspects of group "dynamics," including group size, developmental psychologists have virtually neglected the role of this dimension. It has been noted that, once gender segregation is established, boys' groups are larger, while girls tend to play in dyads and triads (Hartup, 1983; Maccoby and Jacklin, 1987). Although factors affecting onset and maintenance of a phenomenon are not necessarily the same, group size might also affect children's pre-segregation interactions, possibly affecting boys' and girls' relations differently.

It is possible that the dyad is the natural "unit" of interaction, at least in young children (see Mueller, 1979; Roberts, 1989). In one of the few studies on the role of group size in the interactions of toddlers, Vandell and Mueller (1977) found that group size affected toddlers' interactions. Among other things, they found that toddlers interacted less in groups larger than two than they did in dyads. Although it was not clear why this was so, they suggested that in some way the group situation may contain

too many stimuli for toddlers just beginning to interact.

The extent to which group size affects the interactions of young preschoolers was recently studied by Urberg and Kaplan (1989). They found that the size of groupings for parallel play were significantly larger than the size of groupings for interactive play. They suggest, following Hartup's (1983) idea that attention is diffused in larger groups, that interactive play may disintegrate into parallel play if the play group enlarged.

Purpose of the Present Study

It would be valuable to extend the results of previous studies by observing children in the environment which spawns gender segregation, that is, in the group setting of the preschool (Hartup, 1983; Maccoby & Jacklin, 1987), over a period of time to ensure representative data. In this way, the possibility of same-sex group compatibility during free play could be explored. If children who do not yet play primarily in gender-segregated groups interact in a more socially proximal way when they are in same- vs. opposite-gender groups, then same-gender social groups with sex-differentiated play styles might be encouraged. These groups might be encouraged even if some of the proximal behaviors have a negative valence (e.g. object struggles - see Strayer & Pilon, 1985). They might be promoted partly due to the 'reciprocal determinism' (Bandura, 1978) between social interaction and social skills, and partly due to the

intrinsically reinforcing property of more socially intimate interaction. If same-gender interactions are more compatible than mixed-gender relations, prior to gender segregation, then a behavioral basis of segregation would be supported.

To date there has been little research exploring the role of gender as a social or group variable in naturally-occurring social interactions of preschoolers. Only one study, which was statistically limited, has compared the social interactions of young children across different group compositions, such as same-gender dyads and mixed-gender dyads, as these groups spontaneously form during the free play of preschoolers. Careful, descriptive information is needed on children young enough to play in both same- and mixed-gender groups, yet old enough to interact in a relatively complex fashion. Observations of children around three years of age in a naturalistic setting would enable us to study interactions occurring in groups varying in size and gender composition as they naturally occur during free play.

The purpose of the present study was to observe children young enough to not yet engage in primarily sex-segregated play, and to compare their interactions in same- and mixed-gender groupings as these naturally occurred during free play in a group situation. Observations were conducted with children who knew each other and who played

together daily in the preschool. Children were observed in the classroom during free play time with teachers present but not structuring any specific activities. Repeated observations over time were conducted in order to obtain data that was representative of the children's modes of interacting.

The nature of interactions in differently composed groups, as they naturally occurred, was investigated. Group composition refers to two dimensions: size and gender. For example, a gathering of four boys would be a same-gender group. One boy and one girl together would be a mixed-gender dyad. Interactions (e.g. cooperative, conversational, rough and tumble) across different types of groupings (i.e. same-gender dyads vs. mixed-gender dyads; same-gender groups vs. mixed-gender groups) were compared.

Main Hypotheses

Hypothesis 1. The central questions of the present study involve same-sex compatibility before gender segregation is pervasive. A logical first step would be to examine whether gender segregation, that is, a significantly greater number of same-gender groupings than mixed-gender groupings, occurred in our sample.

Prediction. Mixed-gender groupings will occur equally as often as, or predominate over, same-gender groupings.

If no difference in frequency of groupings is found (or if mixed-gender groupings are more numerous than same-gender

groupings), hypotheses concerning same-sex compatibility will be explored.

Hypothesis 2. Same-gender groupings will be more compatible than mixed-gender groupings. Since there is some evidence that young children may interact more in dyads than in groups (e.g. Vandell & Mueller, 1977), size as well as gender of a group must be considered. Therefore, it is hypothesized that more compatibility will be found in same-gender groupings, but that group size may contribute to the pattern of social associations.

Predictions.

a. There will be a higher frequency of distal social relations (e.g. parallel play, watching) in mixed-gender groupings than in same-gender groupings, across both dyads and groups.

b. There will be a higher frequency of proximal sociable interactions (e.g. cooperative play, conversation, rough-and-tumble) in same-gender groupings, across both dyads and groups, than in mixed-gender groupings.

c. There will be more "negative" interactions (object struggles, aggression) in same-gender groupings, across both dyads and groups, than in mixed-gender groupings.

For predictions b. and c.: There may be an interaction between group gender and group

size such that mixed-gender dyads may have more interactions than mixed-gender groups.

d. There will be more passive interactions (e.g. withdrawal) in mixed-gender groupings than in same-gender groupings, across both dyads and groups.

Hypothesis 3. Considering only same-gender groups, there will be differences between interactions occurring in boy groups as opposed to girl groups.

Predictions:

a. There will be more agonistic interactions in male groups than in female groups.

b. No other differences are predicted a priori: They will be empirically investigated.

Hypothesis 4. As Jacklin and Maccoby (1987) found, there will not be a stable tendency for individual children to be in same- or mixed-gender groupings since assortment by gender is considered to be an emergent property of group relations.

Prediction: Stability quotients of group association at different points in time will not be high.

Method

Subjects

Subjects consisted of 55 preschool children from two preschools serving a middle to upper-middle class neighbourhood in Montreal. This was the initial school experience of these subjects. Data were collected in a total of five classes over a period of two school years: 1986-87, and 1987-88 (see Table 1 for the breakdown of subjects by school, class, year, and sex). There were 26 males and 29 females ranging in age from 26 to 37 months with a mean of 33 months (sd = 2.8) at the beginning of the school year.

Subjects were selected somewhat differently at the two schools. At RB, all children in the school are grouped together into one large class, creating a mixed-aged group setting, with children ranging in age from two to five years. Subjects for the present study were selected on the basis of birth date: children 36 months or younger at the beginning of the school year were included. At SA, children are in separate classes, divided according to age, each usually comprising 10 children. The children in the youngest classes at SA were equivalent in age to the youngest children at RB (two children were 37 months of age). Thus, all of the children in the youngest classes were considered eligible as subjects.

Table 1

Breakdown of Subjects by School, Class, Year, and Sex

School	Males	Females
RB		
Year		
1986-87	8	8
1987-88	6	5
SA		
Year		
1986-87	6	4
1987-88		
Morning Class	4	6
Aft. Class	2	6
Total	26	29

In each school parents were informed of the videotaping of their child's class for research purposes. Normally individual consent is not required in order to videotape entire class groups. However, the parents and administrators of SA preferred that individual consent forms be requested. Therefore, letters soliciting participation and including consent forms to be returned to the school were sent to parents of subjects. The parents of two children refused permission to have their children participate as subjects. Three subjects were lost to attrition.

The fifty-five subjects were the "target subjects" of the observations being conducted. As part of the study, however, all peers with a target child were recorded. While some of these peers may have been other target children, others were older children not considered target subjects of the present study. In order to identify them, these children were also assigned identification numbers. In 1986-87, there were 22 older non-target peers, all from RB, the mixed-age preschool. In 1987-88, there were 68 non-target, older peers: 28 from RB, and 40 from SA. Unlike in 1986-87, when target children at SA played in their own classroom by themselves, in 1987-88, SA children played with children from an adjoining classroom during free play. There were 20 older peers for each of the morning and afternoon classes.

Observational Procedures

Approximately twice a week per class, the children's naturally occurring behaviors during free play were videotaped using a hand-held Sony Betamovie BMC-550 videocamera equipped with a battery pack, telephoto and wide angle lens features, and with the capability of displaying the time, in minutes and seconds, on the videotapes.

The videotapers, all female, consisted of the author, a fellow doctoral student, two undergraduates in 1986-87, and two different undergraduates in 1987-88. Videotaping was conducted in teams, two per year, with each team consisting of a graduate and an undergraduate student. One team was assigned to RB and the other to SA because both schools expressed the desire to have as few different visitors as possible in their midst to minimize disruption.

Prior to commencing the videotaping, each team visited the classrooms four or five times over a two-week period, to allow children and teachers to become accustomed to their presence, and to learn to identify all the children. Toward the end of this familiarization period, researchers brought the videocamera to the classroom, but did not record. After initial curiosity and attention toward the researchers subsided, the children seemed to behave in a natural way while they were present. It has been speculated that allowing a habituation period prior to commencing videotaping may reduce subject reactivity (Johnson &

Bolstad, 1973). It has also been speculated that children under the age of 6 may react less to direct observation than older subjects (see Hartmann & Wood, 1982). Once videotaping commenced, the senior member of each team accompanied the junior member approximately three times to guide the latter in videotaping procedure. After this, only one videotaper went to the school at a time.

The person operating the videocamera stood in parts of the classroom where the children were not playing. Each session, videotaping proceeded for the entire free play period, the length of which varied by school: free play was approximately half-an-hour per class per half-day at SA, and approximately an hour per half-day at RB. Videotaping commenced when 50% of the children were present. Each target child was videotaped approximately four to seven times per free play period, each time in a randomly predetermined order. Stopwatches (JMC Super Timer Stopwatch with Quartz LCD display) were set to count down from 16 to 0 seconds, at which time they emitted a beep, which signalled the videotaper to end recording. From each recording, 10-second segments were coded. Pilot observations revealed that it was necessary to allow slightly longer than 10 seconds to yield a suitable sample. For example, the camera only began recording one to two seconds after it was switched on. In addition, an extra few seconds was often needed to ensure that all children in a group were

identified. At the end of a videotaping session, the daily attendance was recorded.

In the first year of the study, subjects were videotaped an average of 52.2 times (with a standard deviation of 14.45) during the Spring semester of 1987. Since each segment yielded 10 seconds of coded data, an average of 8.7 minutes of data was obtained per child. In the second year, subjects were videotaped during the Autumn and Spring semesters of 1987-88. An average of 99.3 videotaped segments (with a standard deviation of 11.49) per child were obtained, yielding an average of 16.6 minutes of data per child.

Classroom Settings

It was previously mentioned that there was one mixed-age class at RB. Therefore, approximately 20 to 40 children between the ages of two-and-a-half to five were together during free play. The number of children varied greatly because not all children were registered for each day (and children this age are often sick). The preschool was in an old converted church: very large, with high ceilings. Children were not directed during free play: teachers rarely actively intervened except in the case of aggression. There were approximately four teachers present on any given day, usually three female and one male.

At SA, children were arranged into age-homogeneous classes, in separate classrooms of approximately 20 children

each. There was one female teacher per class. Children were allowed to interact in an unconstrained way during free play as long as they were not aggressing, shouting, using materials not intended for free play, building too high with the blocks, or wandering aimlessly. In all the above cases, the teachers were quick to intervene and redirect. In 1986-87, the target children had free play by themselves in their own classroom. In 1987-88, the target children had free play with two other classes, with children who were, on average, approximately 6 months older. The door between two classrooms was open, and play took place in both classes, with children permitted to circulate as they wished between rooms. Approximately 20 to 30 children were together during free play.

Both schools had standard preschool toys and areas, such as blocks, dolls, books, transportation toys, dress-up clothes, a kitchen area, waterplay and sandplay areas, and tables set up for various art activities. Pilot investigations revealed that similar types of play occurred at the two schools.

Observational Codes

A coding system was developed for a study of possible origins of gender segregation. The purpose of the overall study, of which the present thesis is a part, was to examine several possible influences on gender segregation, such as: toys and toy play, peers and social interaction, activity

level, social competence, and gender identity. The current discussion focuses on issues of group composition and peer interaction.

In the Autumn of 1986, the coding system was developed by live observation of free play behavior in the preschool, by videotaping several long segments, and by review of the literature relevant to the social interactions and play activities of preschoolers (e.g. Blurton-Jones, 1972; Eckerman, Whatley & Kutz, 1975; Jacklin & Maccoby, 1978; La Freniere, Strayer & Gauthier, 1984; Mueller & Vandell, 1979; Parten, 1932; Rubin, Maioni, & Hornung, 1976; Strayer, 1980; Strayer & Pilon, 1985).

For the purposes of the present thesis, the coding system involved noting the occurrence of different categories of behaviors for each interval on a target child. Only one behavior per 10-second period was noted. The codes and coding decisions for all the behaviors in this thesis, as well as in the larger study, are listed in detail in the coding manual in Appendix C. Discussion here is limited to the categories relevant to the present thesis.

Group Composition. The number of children of each sex with a target child was recorded. In addition, the identification numbers of the peers with whom interaction occurred were recorded. To determine the number of peers (male and female) with the child, certain rules were developed concerning what constituted a group (see Appendix

C). Generally, a peer was considered a group member if he/she was within 5 feet of the target child, and did not have his/her back to the group. Our observational code was structured so that all intervals were codable by our system. Thus, when a target child was with no peers, that information was noted (0 males, 0 females). In this way, our code was exhaustive: all segments were retained, rendering the data more representative of preschooler behavior than it would be otherwise (Bakeman & Gottman, 1986).

Social Engagement. The types of social behaviors target children engaged in was recorded. The social behaviors retained were those which either frequently occurred (such as parallel play and watching), were salient (such as aggression, object struggles), sociable (such as cooperative play, and conversation), or thought to be related to group processes (such as "approach", and "withdraw").

The observation code was structured so that social engagement behaviors were mutually exclusive (see Bakeman & Gottman, 1986). That is, for each 10-second interval, one, and only one, type of social interaction occurring between a target child and a peer was recorded from a checklist of 25 possible types of interaction. Distinctions were made between peer and teacher interactions, so these could be considered separately in analyses. Four of the 25 types of

interaction concerned relations between the target child and the teacher (storytelling with teacher, seek help - teacher, teacher conversation, and general interaction with teacher). The other behaviors concerned relations between the target child and another (other) peer(s). Table C-2 in Appendix C contains the list of social engagement behaviors, while Table C-5 comprises the definitions for each behavior. The interaction occurring for the longest period of time was recorded for the interval, with the exception of rarely occurring proximal interactions (such as show, aggression), which were coded even if they only occurred for a few seconds. If two interactions occurred for equal amounts of time, a previously established hierarchy of codes was consulted to decide the appropriate behavior (see Table C-6 in Appendix C).

In addition to the social interaction behaviors described above, four "miscellaneous" behaviors were included chiefly so that all segments of data would be codable: that is, to yield a coding system that was exhaustive. These were: unoccupied, aimless wandering around the classroom, crying, and being in transition between two activities. If a child was not with any peers, and was not behaving in a "miscellaneous" fashion, generally because their behavior was purposeful (e.g. playing with a toy), this was noted as solitary play.

Preliminary analyses on a portion of the data showed

levels of social behavior comparable to other reports in the literature. For example, we observed that parallel play occurs frequently, while aggression occurs rarely, as others have reported (e.g. Bakeman & Brownlee, 1980; Eckerman, Whatley, & Kutz, 1975; Eisenberg, Tryon & Cameron, 1984; Fagot & Hagan, 1985; Parten, 1932).

Daily Attendance. The total number of males and females present that day was recorded, so that the number of peers of each sex with whom a target child played could be weighted by the total number of children of each sex available to the child.

Preparation of Videotapes

Each interval was initially viewed to determine the 10-second segment to be coded. That is, of the 16 seconds videotaped for the interval, the exact time (as marked on the videotape) of the 10-second segment to be coded was written on the coding sheet. Time was displayed in minutes and seconds on the videotape. In general, the segment to be coded had to begin within the first 2 or 3 seconds of videotaped interval to minimize bias which may occur by perusal of the interval and selection of the "most interesting" segment. Once the segment was chosen, the target child's identification number, and associated 10-second interval was written on a coding sheet. An example of the coding sheet can be found in Appendix C (see Table C-8). On each coding sheet, the school, tape number, session

number, date of the session, counter time of session onset, date of coding, and the name of the coder were recorded.

Coding Procedures

After the coding sheets were prepared in this manner, coders (the same personnel as above) proceeded to the interval associated with each target child on their sheet. They observed the segment two or three times. Generally, a first "pass" yielded information about the general context, for example, what toy a child had, whether he or she was alone or with others, and whether they were socializing. With the second and third passes, more specific decisions were made, such as the type of social interaction, and identification of all peers in a group.

Data from coding sheets were entered into Concordia University's VAX VMS mainframe computer.

Coder Training and Reliability

Coders were trained by the author and by a fellow doctoral student for a training period of six weeks to two months on either pilot investigation tapes or on tapes that were already coded. Coding of new tapes did not proceed until a reliability rate of 80% between predetermined pairs of coders was achieved for each category.

To analyze inter-rater reliability, 21.5% of the data was double-coded. Each coder was paired equally often with every other coder. For the purposes of ongoing analysis of reliability while the data were being collected, reliability

was calculated by the formula:

$$\frac{\text{\# of agreements}}{\text{\# of agreements + \# of disagreements}}$$

Reliability was calculated between predetermined pairs of coders, separately for each behavioral category, according to the guidelines found in Appendix D.

Reliability was randomly assessed throughout the entire data collection period. Coders were unaware of which intervals were assessed for reliability, and with which coder they were being compared (Hartmann & Wood, 1982; Johnson & Bolstad, 1973). Weekly meetings were held to discuss any coding difficulties that were encountered, and to keep motivation high. Research has shown that regular reliability meetings are necessary to avoid 'observer drift' (Fagot & Hagan, 1986; see Hartmann & Wood, 1982): indeed, on the rare occasions when we missed a week, reliability was lowered. When reliability for any category on a free play session was lower than 70%, the coding manual was reviewed, and the troublesome segments were inspected. Subsequently, that category was recoded for the entire session.

In every case, this was sufficient to boost reliability to at least 70%. For our data, percent agreement was 85.7% for number of peers in a group, and 80.2% for social engagement.

The percent agreement equation has been criticized

since it does not include an adjustment for chance agreement (see Hartmann & Wood, 1982). Nevertheless, this was probably an appropriate method to examine reliability for group composition because determination of group composition is fairly objective (e.g. counting the number of children present, determining their sex) and group composition is not strongly influenced by chance. In other words, observers don't have, for example, a 50% chance of being right every time they rate, such as would happen if a particular observation could be scored as either and only a or b. For a particular observation, there could be 0 peers, 1 peer, 10 peers - i.e. no predetermined categories.

Social engagement, on the other hand was coded by rating the observed behavior by a behavior checklist (parallel, solitary, etc). There were many categories so in theory, chance agreement would be low, approximately three to four percent. Since only a subset of behaviors were scored most of the time, chance agreement would probably have been somewhat higher in practice, perhaps 10 to 15% Although this is considerably lower than the 80.5% we found, it seemed prudent to analyze a subset of the reliability data using Kappa, which corrects for chance agreement (Hollenbeck, 1978).

Another criticism of percent agreement (Hartmann & Wood, 1982) is that categories are collapsed, so it cannot be determined whether some behaviors (e.g. parallel play)

indeed are highly reliable between raters, pulling the percent agreement up, whereas other categories are not very reliable. Kappa structures the data such that one can examine agreements and disagreements for each behavior.

Therefore, the Kappa equation was used to calculate reliability on approximately 20% of the social engagement data, and compared to the result from percent agreement on that data. Percent agreement was .82, and kappa was .78. All behavior categories were reliable. The interactive categories (e.g. % agreement = .73 for cooperative play, .83 for conversation) were slightly less reliable than parallel (% agreement = .93) or solitary play (% agreement = .86), but in almost every case, interaction was seen but labelled differently by the two observers. For example, one might have seen cooperation where the other saw a conversation. Table 2 shows percent agreement for the social engagement categories (see Table 2).

Since the results of percent agreement and Kappa were similar, indicating agreement between observers was not due to chance, and since all behavior categories seemed reliable, kappa was not used to correct for chance on the rest of the reliability data.

Table 2

Percent Agreement for the Social Engagement Categories

Behavior	Percent agreement	# of occurrences
Transition	.83	6
Wandering	.75	4
Unoccupied	.60	5
Crying		0
Storytelling w teacher		0
Offer help		0
Initiate		0
Parallel play	.93	80
Cooperative play	.73	26
Affection	0.00	1
Seek help-teacher	1.00	1
Seek help-peer		0
Watching	.67	21
Attempt take		0
Take	1.00	1

Note: "Occurrence" refers to the number of times the behavior was observed (i.e. the total of agreements and disagreements) in the 21.5% of data double-coded for reliability.

Table 2 - continued (Page 2)

Percent Agreement for the Social Engagement Categories

Behavior	Percent agreement	# of occurrences
Object struggle	.50	2
Show		0
Aggression	1.00	1
Play hit		0
Rough and tumble		0
Peer conversation	.83	12
Teacher conversation	.80	5
Imitate		0
Approach	.67	3
Withdraw		0
Offer toy	0.00	1
Have toy taken	.50	2
Receive toy		0
Interact with teacher	.90	10
Solitary	.87	30

Results

For all the results described in this section, data across different classroom settings were combined, as there were not enough subjects to warrant maintenance of this grouping variable. Before the decision to combine data was made, however, preliminary analyses were conducted to assess the influence of class. The results of these analyses are presented in Appendix A. In general, the analyses indicated no meaningful patterns of results which can be ascribed to the influence of class.

Group Composition

Group compositions varying on the dimensions of size and gender were constructed from the data in order to test the prediction of hypothesis 1, that mixed-gender groupings will occur equally as often as, or predominate over, same-gender groupings. Group compositions were also constructed to ensure that children were observed in several group contexts and did not congregate mainly in one or two conditions (e.g. same-gender groups).

In terms of size, groupings were computed as either dyads or groups. A dyad consisted of the subject and one peer. A group consisted of the subject and two or more peers. In terms of gender, groupings were computed as either same-gender or mixed-gender. Group composition scores were frequency scores which were weighted by the sex ratio of the class and adjusted for differing numbers of

observations per child (see Appendix A for descriptions of how the variables were constructed).

Four group composition variables were constructed. These were: same-gender dyads, mixed-gender dyads, same-gender groups and mixed-gender groups. The suitability of these variables for repeated measures analysis of variance was examined and after adjusting the scores of outliers (see Appendix A), a repeated measures analysis of variance was performed.

Hypothesis 1: Gender Segregation. A repeated measures analysis of variance was performed with one between-groups factor (sex of subject) and two within-subjects factors: group size (dyad vs. group) and group gender (same vs. mixed). The dependent variable was the number of intervals in each grouping, weighted and expressed as a percentage as described in Appendix A. This analysis was done in order to test the prediction that mixed-gender groupings will occur equally as often as, or predominate over, same-gender groupings. All fifty-five subjects (26 boys, 29 girls) were included in the analysis.

There were significant main effects for both group size, F (1,53) = 96.87, $p < .001$, and group gender, F (1,53) = 50.04, $p < .001$. There was also a significant interaction between group size and group gender, F (1,53) = 622.79, $p < .001$. There was no main effect for sex of subject, and sex did not interact with either of the group composition

factors (see Table B-1, Appendix B). Post-hoc t-tests for correlated samples showed that children were more often in same-gender dyads (M = 30.51, SD = 17.6) than in mixed-gender dyads (M = 19.41, SD = 11.7), $t(54) = 3.52$, $p < .001$. However, in group situations, subjects were more often in mixed-gender groups (M = 73.95, SD = 19.3) than in same-gender groups (M = 20.65, SD = 19.9), t (54) = 16.07, $p <$ .001.

Thus, when in dyads, subjects were more often with same-gender partners than with opposite-gender partners. However, overall, that is, across dyads and groups, there was not gender segregation. In other words, there was certainly not an exclusive concentration of observations in same-gender contexts. Rather, children participated in all cells and actually spent the most time in mixed-gender groups.

Social Engagement

Variables were constructed for use in repeated measures analyses of variance to analyze predictions of hypothesis 2, which states that same-gender groupings will be more compatible than mixed-gender groupings. To do this, the thirty social engagement categories were examined. There were many variables, some occurring rarely. For example, crying and helping each occurred only 6 times in total in the sample. Table A-3 in Appendix A shows the means and standard deviations for each category separately by sex (see

Table A-3). In Table A-3, the variables are expressed as percentages: the number of occurrences of each category divided by each subject's total number of observations.

Clearly, prior to any analysis, reduction of the number of variables was necessary. Reduction of the number of variables by empirical means (e.g. examination of correlation matrices, or factor analysis) was not appropriate since rarely occurring variables yielded no variance. Therefore, categories were deleted or combined on practical and conceptual grounds, oriented to the predictions under study.

Some categories were conceptually distinct and occurred frequently enough to stand alone, such as parallel play and watch. Others were deleted for several reasons. For example, although imitate seems intuitively to be an interactive behavior, it was not included because often a child imitated others without the other(s) having any awareness that the child was even present: in this way imitate often seemed more similar to watching. Therefore, imitate was not included. It was not realistic to examine "social withdrawal" behaviors as "withdraw" and "have toy taken" occurred only a total of 35 times.

Fifteen social behaviors, nine 'prosocial' and six 'agonistic' were aggregated (see Jacklin & Maccoby, 1978) into one "social" or "interactive" category. These were: help, initiate, cooperate, affection, ask peer for help,

show, conversation, give toy, receive toy, try to take toy, take toy, object struggle, aggression, play hit, and rough and tumble. They were combined because all except cooperation and conversation occurred rarely, (including, notably, agonistic interactions) and it was the interactive nature of these categories which was being examined. The socially interactive nature was thought to be more important than the fact that these social behaviors differ qualitatively: some being more molecular than others, some having positive or neutral valence, with others having a negative or intrusive quality.

In the end three categories of behaviors were used in analyses. These are parallel, watching, and social (or interactive). The mean percentage of parallel play in this sample, that is, the average number of times parallel play occurred divided by the total number of observations per child, was $\underline{M}$ = 30.31, with a standard deviation of 10.77, for boys and $\underline{M}$ = 30.50, SD = 10.43 for girls. For watching, $\underline{M}$ = 15.16, SD = 7.91 for boys and $\underline{M}$ = 16.27, SD = 8.82 for girls. For interactive, $\underline{M}$ = 18.31, SD = 9.48 for boys and $\underline{M}$ = 18.50, SD = 10.34 for girls. In other words, overall, children engaged in parallel play approximately one-third of the time, watching about one-sixth of the time, and social interaction almost one-fifth of the time. The rest of their time was spent in solitary play (approximately 11%), interaction with teacher (approximately 10%), and in

miscellaneous activities (approximately 10%) and in other behaviors (such as withdraw) which together added up to the remaining two or three percent of observations.

For each analysis, a dependent variable was computed which consisted of the frequency of a given behavior (e.g. social) while a subject was in each of the four group compositions described above, that is: same-gender dyads, mixed-gender dyads, same-gender groups, mixed-gender groups. Each variable was then divided by the overall frequency of the group composition. For example, the number of times engaged in social interaction while in a same-gender dyad was divided by the number of times same-gender dyads occurred overall. These proportions ensured that data was not affected by the differential rates at which the group composition conditions occurred (recall from the gender segregation repeated measures analysis of variance that, for example, mixed-gender groupings occurred more often than same-gender groupings).

Three repeated measures analysis of variance were planned, with the first analysis utilizing parallel play behaviors as a dependent variable, the second utilizing watching behavior, and the third social interactions. Ideally, in classical repeated measures analyses, all subjects contribute equally to all conditions. This was not the case in the present study. Therefore, in order to use repeated measures analyses of variance, the present data

required a certain amount of tailoring to fit an experimental design. Only subjects who contributed at least a minimum amount of data to each group composition were retained for analyses (see Appendix A for further elaboration). Thirty-eight subjects were retained: seventeen males and twenty-one females.

Three repeated measures analyses of variance were performed, each with sex of subject as a between-groups variable, and with gender and size of group as within-subject factors, after determining the suitability of repeated measures analysis of variance with these variables (see Appendix A).

Hypothesis 2, Prediction A1: Parallel Play behaviors. The first prediction of hypothesis 2 was that there would be a higher frequency of distal social relations (e.g. parallel play, watching) in mixed-gender groupings than in same-gender groupings, across both dyads and groups. For parallel play behaviors, there were no significant main effects for group gender or for group size, nor was there a significant interaction between group gender and group size. There was also no significant main effect for sex of subject. There was, however, a significant three-way interaction of sex of subject by group gender and group size, F (1,36) = 4.21, $p < .05$ (see Table B-2). Post-hoc t-tests for correlated samples did not reveal any significant differences between relevant means. Examination of the cell

means (see Table 3) did not reveal any clear pattern.

Hypothesis 2, Prediction A2: Watching. The analysis was performed after first performing log transformations on the variables to correct for positive skewness (see Appendix A). For watching, there was a significant main effect for group gender, F (1, 36) = 4.24, $p < .05$. There was also a significant main effect for group size, F (1, 36) = 7.42, $p < .02$. There was no significant main effect of sex, nor were there any significant interactions (see Table B-3). Examination of the means revealed that children spent significantly more intervals watching when in mixed-gender groupings, that is, dyads and groups combined, (M = .075, SD = .042) than in same-gender groupings (M = .057, SD = .042). These results supported prediction A. It was also found that there was significantly more watching in groups (with same- and mixed-gender combined) (M = .078, SD = .043) than in dyads (with same- and mixed-gender combined) (M = .055, SD = .041). Table 4 shows means for watching in each grouping, and means for scores collapsed across within subject factors (see Table 4).

Hypothesis 2, Predictions b and c (combined): Social interactions. In the third analysis, the dependent variables were (a) number of times social interactions occurred in same-gender dyads, (b) number of times social interactions occurred in mixed-gender dyads, (c) number of

Table 3

Parallel Play Engagement by Group Composition: Cell Means (Percentages) and Standard Deviations

Group Composition	Mean (SD)
Same-gender dyads	
Males	0.35 (0.22)
Females	0.40 (0.21)
Both Sexes	0.38 (0.21)
Mixed-gender dyads	
Males	0.47 (0.23)
Females	0.37 (0.19)
Both Sexes	0.41 (0.21)
Same-gender groups	
Males	0.47 (0.21)
Females	0.42 (0.25)
Both Sexes	0.44 (0.23)
Mixed-gender groups	
Males	0.39 (0.13)
Females	0.41 (0.14)
Both Sexes	0.40 (0.13)

Note: N = 38: 17 males and 21 females.

Table 4

Watching by Group Composition: Cell Means (Percentages) and Standard Deviations

Group Composition	Raw Mean (SD)	Log Transformed Mean
Same-Gender Dyads	0.11 (0.12)	0.042 (.044)
Mixed-Gender Dyads	0.18 (0.18)	0.067 (.061)
Same-Gender Groups	0.20 (0.20)	0.072 (.068)
Mixed-Gender Groups	0.22 (0.11)	0.083 (.040)
Same-Gender Groupings[a]	0.15 (0.12)	0.057 (.042)
Mixed-Gender Groupings[a]	0.20 (0.11)	0.075 (.042)
Dyads[b]	0.14 (0.11)	0.055 (.041)
Groups[b]	0.21 (0.12)	0.078 (.043)

Note: N = 38: 17 males and 21 females.

[a] Averaged across dyads and groups

[b] Averaged across same-gender and mixed-gender

times social interactions occurred in same-gender groups, and finally, (d) number of times social interactions occurred in mixed-gender groups. There was a significant main effect of group size, F (1,36) = 13.71, $p < .001$, and a significant main effect for group gender, F (1,36) = 5.82, $p < .05$. There was also a significant interaction between group size and group gender, F (1,36) = 11.93, $p < .001$. There was no significant main effect for sex of subject, nor were there any other significant interactions (see Table B-4).

Post-hoc t-tests for correlated samples revealed that there were significantly more interactions in same-gender dyads (M = .34, SD = .20) than in mixed-gender dyads (M = .20, SD = .16), t (37) = 3.47, $p < .001$. T-tests did not indicate that amount of interaction differed in same- (M = .20, SD = .19) vs. mixed-gender groups (M = .20, SD = .11), t (37) = .10, p = n.s. Further, interactions in same-gender dyads also occurred more frequently than in same-gender groups, t (37) = 4.34, $p < .001$. Because multiple t- tests were performed, a correction to alpha was made to reduce the likelihood of type 2 error. Therefore, $\alpha = .017$, rather than the traditional $\alpha = .05$ was used.

There was much more social interaction in same-gender dyads than in any other group composition, which were all at almost exactly the same rate of approximately 20%. Therefore, the major prediction of the study was partially

confirmed in that there was more interaction in same-gender than in mixed-gender groupings. However, this was really true only in the dyadic situation.

There are several possible explanations for the result of greater interaction in same-gender dyads. If something about the same-gender group situation per se facilitates same-gender interaction, we should see subjects interacting with a range of other same-gender children. The actual identity of specific peers would not add much information above and beyond the group composition since subjects would interact with a variety of same-gender peers. There would be no "dyadic stability." On the other hand, if children interacted primarily with the same peer or two throughout the course of the observations, the finding of greater interaction in the same-gender dyadic situation would actually be explained by individually-oriented factors (e.g. possibly, peer familiarity) rather than group-oriented factors.

In order to examine how greater interaction in same-gender dyads was manifested, the actual identity of the same-gender peer in each interaction was examined. To a certain extent it would be arbitrary to define, a priori, how often a child would have to play with a peer for that peer to be considered a frequent playmate. This is especially so since children varied greatly in their number of same-gender interactions (from 0 to 23), in their total

number of observations (and thus the chance to be observed in same-gender interaction) and since classes varied in gender composition and thus in the chance probability of playing with the same peer twice. Therefore, we simply scored the number of times subjects played with specific peers, if they played with these peers two or more times (see Table 5).

Table 5 shows quite strikingly that eight subjects (the first eight in the table) seemed to interact frequently with one specific peer (in one case (5B) there also seemed to be a second specific peer with whom interaction was frequent). A ninth subject (5L) could also be considered to interact somewhat often with a specific peer. At the same time, these subjects were children with the largest number of same-gender dyadic interactions.[2] In addition, all nine of these children interacted with these specific peers in other group compositions, that is same-gender groups and mixed-gender groups.

These results suggest that the finding of more interaction in same-gender dyads may be caused by a small number of children who interact frequently, and who interact in stable dyadic relationships. To verify if this was true, the repeated measures analysis of variance on social

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[2]It should be noted that data from interaction in other group compositions showed that there were no mixed-gender high-frequency playmates: all high-frequency playmates were same-gender: some of these were reciprocal.

interactions in different group compositions was performed again with the nine children with dyadic relationships removed, that is, with the remaining 29 children.

The ensuing results were very similar to those of the original analysis. There was no main effect of group gender, but there was a main effect of group size, F (1,27) = 7.38, $p < .02$, and a significant interaction between group gender and group size, F (1,27) = 7.83, $p < .01$ (see Table B-5). T-tests for correlated samples revealed, as before, that there were significantly more interactions in same-gender dyads (M = 0.27, SD = 0.18) than in mixed-gender dyads (M = 0.18, SD = 0.15), t (28) = 2.17, $p < .05$, and than in same-gender groups (M = 0.14, SD = 0.15), t (28) = 3.35, $p < .01$ (for both these tests, adjusted $\alpha = .025$). Percentage of interaction in mixed-gender groups (M = 0.19, SD = 0.11) was in the range of the latter two means.

A similar result was found when the nine children with dyadic relationships were excluded as when they were included, albeit the results were slightly weaker. This finding indicates that though a subset of children interact frequently in stable dyads which may have more to do with individual characteristics than with group situations, there is still something about the same-gender dyadic situation per se, above and beyond the specific individuals in those dyads, which is conducive to higher rates of social interaction.

Table 5

Number of Interactions with Specific Peers in Same-Gender Dyads

Subject	Id #	sex	peer id#	no. of interactions
1.	5B	M	5D	15
			5H	6
2.	5D	M	5B	18
3.	5E	F	6Z	10
			6G	2
4.	5G	F	5K	11
5.	07	F	03	6
			04	3
6.	08	M	10	8
7.	3A	F	4D	8
8.	10	M	08	5
			05	2
9.	5L	M	6V	4
			6W	2
10.	3C	F	3B	2
			3F	2
11.	04	F	06	2
12.	1C	F	1I	2

Table 5 - Cont'd (Page 2)

Number of Interaction with Specific Peers in Same-Gender Dyads

Subject Id #	sex	peer id#	no. of interactions
13. 1D	M	2H	2
14. 3D	F	3F	2
15. 5J	F	6Z	2
16. 03	F	07	2
17. 1A	F	1B	2
18. 1B	F	1A	2
19. 1G	F	1C	2
20. 3B	F	3C	2
21. 3G	F	3F	2
22. 3H	M	4O	2

Note: Only peers appearing two or more times are identified.

As discussed above, it was not possible to analyze agonistic interactions separately as they were rare. They were combined with more prosocial interactions. It should be noted that preliminary analyses utilizing only the prosocial interactions yielded essentially the same results as presented above. Table A-2 in Appendix A, which presents the means of assertive interactions by group composition shows that assertive interactions occur rarely, approximately 4% of time in each group composition. Although with so little variance, real differences between groups cannot be considered, it is interesting that the only cell with virtually no assertive interactions is boy-only groups ($\underline{M}$ = 0.003, or .3%)

It was not possible to analyze the results for the fourth prediction of hypothesis 2, that there would be more passive behaviors (withdrawal and have toy taken) in mixed-gender groupings, because these almost never happened (less than 1% of observations: see Table A-3).

Hypothesis 3: Differences between male and female groups. The third hypothesis stated that within same-gender groupings, there would be differences between interactions occurring in boy groupings compared to girl groupings. It should be noted that the sexes did not differ in proportion of social interactions as indicated by the results in the preceding analyses (hypothesis 2) that sex was neither a main effect nor did it interact with the group composition

variables.

It had been tentatively predicted that there would be more assertive interactions in male groupings. Although assertive interactions occurred so rarely as to be difficult to interpret anything, it is ironic that the one cell with practically no assertive interactions is the male same-sex group cell (see Table A-2 in Appendix A).

T-tests were performed comparing the means of boy dyads to girl dyads, and boy groups to girl groups on those social engagement variables which were observed in at least one percent of the group composition (that is, either same-gender dyads, or same-gender groups). Only four variables occurred frequently enough in same-gender dyads, and, similarly, only four variables occurred frequently enough in same-gender group to be subjected to analyses. The four variables occurring in same-gender dyads were: cooperative, peer conversation, object struggles, and rough and tumble. The four variables occurring in same-gender groups were: cooperative, show, peer conversation and object struggles. None of the analyses (see Tables B-6 and B-7) yielded significant differences between means (see Tables 6 and 7). These results indicate that boy groupings and girl groupings did not engage in different types of interaction.

Hypothesis 4: The stability of individual differences in group compositions and social behaviors. Analyses were performed to examine whether individual children had

Table 6

Comparing Male and Female Same-Gender Dyads on Several Social Interaction Categories: Cell Means (Percentages) and Standard Deviations

Behavior	Mean (SD)
Cooperative	
Males	.20 (.18)
Females	.16 (.13)
Peer conversation	
Males	.10 (.10)
Females	.10 (.11)
Object struggle	
Males	.03 (.05)
Females	.01 (.04)
Rough and tumble	
Males	.01 (.02)
Females	.01 (.04)

Note: For all categories, N for males = 17, N for females = 21.

Table 7

Comparing Male and Female Same-Gender Groups on Several Social Interaction Categories: Cell Means (Percentages) and Standard Deviations

Behavior	Mean (SD)
Cooperative	
Males	.10 (.13)
Females	.09 (.13)
Show	
Males	.01 (.06)
Females	.02 (.07)
Peer conversation	
Males	.07 (.09)
Females	.06 (.11)
Object struggle	
Males	.003 (.01)
Females	.02 (.06)

Note: For all categories, N for males = 17, N for females = 21.

tendencies to participate in specific group compositions, and in specific social engagements. To examine whether children tended to reliably assort themselves into specific group compositions, data from the first 50 intervals of the 38 children who were the principal participators in the above analyses were examined[3]. Only intervals where children were in groups were retained, leaving most children (35) with at least 32 intervals. "Odd-even" stability coefficients were examined by creating two scores for each child, one for all odd intervals and one for all even intervals, expressing the number of same-gender assortments, and correlating them. Stability was fairly high, r (df = 33) = .67, $p < .001$.

To examine whether children's social engagement behavior showed stability, the first 50 intervals for the 38 children were analyzed. As seen in Table 8, "odd-even" reliability coefficients were calculated for solitary, parallel, affiliative, assertive, and total social (affiliative plus assertive). In general, these behaviors were all moderately stable (see Table 8). In other words, individual children behaved consistently in the context of the behaviors under observation.

To summarize, there were several key results of the present study. To begin with, gender segregation was not

[3]For some subjects, only around 50 observations had been recorded.

found as a generalized phenomenon in this sample. There was support for the prediction that distal social relations (watching) would occur more frequently in mixed-gender than in same-gender groupings. Most importantly, there was partial support for the prediction that proximal social relations would occur more frequently in same-gender groupings. This prediction was supported for the dyadic situation and this phenomenon was shown not to be an artifact of same-gender dyadic relationships.

Table 8

Stability of Individual Differences in Social Behavior

Behavior	odd-even stability
Solitary	.56***
Parallel	.54***
Social	.65***
Assertive	.49**
Total Social	.71***

Note: For all correlations, N = 38

**: $p < .01$

***: $p < .001$

Discussion

The purpose of the present study was to observe children young enough to participate frequently in various group compositions and to examine the impact of group context on their social behaviors with peers as these naturally occurred during free play in a group situation. In other words, the role of group composition in an environment in which play groupings naturally formed was examined. The major goal was to compare the behaviors occurring in same- and mixed-gender groupings to explore the hypothesis that same-gender groupings would be more compatible than mixed-gender groupings. Specific predictions were tested which explored certain definitions of compatibility. A minor goal was to explore the hypothesis that there would not be a stable tendency for individual children to be in same-gender groupings.

Gender Segregation

Before these goals could be addressed, however, the very first step in the present study was to see whether gender segregation was present in the groups of subjects observed. It was predicted that mixed-gender groupings would occur equally as often as, or predominate over, same gender groupings. There were significant main effects for both group size and group gender. There was also a significant interaction between group size and group gender. In groups, subjects spent significantly more intervals with

peers of both genders than with same-gender peers. However, in dyads, children were significantly more often with same-gender peers than with other-gender peers.

Therefore, gender segregation was not found as a consistent pattern. In fact, the largest proportion of time was spent in mixed-gender groupings. However, in the dyadic context, children spent significantly more intervals with same-gender peers than with opposite-gender peers. Overall, the children played frequently in several different types of group composition, rendering it possible to compare the sorts of interactions occurring in various groupings.

Same-sex Compatibility

Parallel play. It was predicted that distal social behaviors (parallel play, watching) would occur at a higher rate in mixed-gender groupings than in same-gender groupings. This prediction was not supported for parallel play. There were no significant main effects or two-way interactions. No discernible pattern of results was found for parallel play: it represented about 40% of each group composition.

There are several possible explanations for this finding. One is that parallel play is not affected by the group context in which it occurs. Parallel play may be a salient mode of social behavior in this age-group which outweighs the effect of group composition. Another explanation for the failure to find a relationship between

parallel play and group composition is (as discussed in a subsequent section of this discussion) that the measure of parallel play used in the present study was not sensitive enough to detect subtle grouping differences.

Watching. The prediction of more watching in mixed-gender groupings than in same-gender groupings was supported. There were significant main effects for both group gender and group size. There were no significant interactions. Children spent significantly more intervals watching when in mixed-gender groupings than in same-gender groupings. There was also significantly more watching when in groups than when in dyads. The result of more watching in mixed-gender groupings may be considered an indication of a lack of compatibility.

Proximal interactions. It was predicted that proximal social behaviors (e.g. conversation, cooperation) would occur at a higher rate in same-gender than in mixed-gender groupings. This prediction was partially supported. There were significant main effects for both group gender and group size, as well as a significant interaction between these two factors. These results revealed that significantly more interactive behaviors were found in same-gender dyads than in mixed-gender dyads. These results are consistent with most previous studies which compared same- and mixed-gender dyads. In the present study, no differences were found between same- and mixed-gender

groups, nor between same-gender dyads and groups. Social interaction occurred at a rate of approximately 34% of observations in same-gender dyads, whereas social interaction comprised about 20% of each other group composition. In other words, it was the sex-homogeneous dyadic context, in particular, that supported interaction.

In the present study, the facilitative environment of the same-gender dyad did not seem to be merely a function of same-gender dyadic relationships. An analysis was performed to determine if the higher rates of social interaction in same-gender dyads occurred because same-gender dyads were mainly comprised of peers who usually play together. The analysis concerning proximal interactions was repeated, removing nine children with high-frequency playmates: it yielded very similar results.

Some of the children who served as playmates for the target children in the present study were often approximately six months, sometimes one year, rarely two years older than the target subjects. It is possible that older children, with presumably more developed senses of gender identity, and better social skills, may have chosen same-gender peers, who happened to be younger, to interact with. Thus it is possible that age could at least partially account for the results of greater interaction in same-gender dyads. However, if that were the case, one would also expect to have observed greater interaction in same-

gender groups. In addition, the effect of age seems more likely if older children had been the target subjects. Since younger children were the target subjects and they interacted with a range of others, it does not seem likely that they would have been observed mostly with older children particularly in the same-gender dyad. Further, a study which examined the relationship between group age composition and type of social engagement found a greater than expected number of same-aged children in interactive play (Urberg & Kaplan, 1989).

Other Interactions. It should be remembered that there was insufficient data to compare agonistic and passive behaviors occurring in same- vs. mixed-gender groupings. It should also be remembered that boy groupings and girl groupings did not exhibit significantly different types of social interactions.

Stability of Individual Tendencies to be in Same-Gender Groupings

In this research, the emergent group process aspect of gender segregation has been stressed. The purpose of this study was to emphasis this neglected aspect of gender socialization. It was predicted that stability quotients reflecting consistency of same-gender grouping at different points in time would not be high. This prediction was not supported as stability quotients were fairly high, suggesting that individual children varied in their

tendencies to be in same-gender groupings.

Maccoby and Jacklin (1987) did not find stable individual tendencies towards same-gender assortment. They did not explain how they calculated stability, but they obtained a moderate correlation coefficient which seemed to be based on the analysis of only two points of observation ($r = .39$, $N = 12$). In the present study on the other hand, stability was based on over 30 observations and aggregated data by nature is more stable.

The results of stability in the present study imply that the role of the group situation cannot be considered more important that the role of possible individual differences in the development of same-gender interactions. Individual characteristics, such as, for example, gender identity, may influence individual's tendencies to be in same-gender groupings. Group context may more usefully be considered as part of a bi-directional process. Individuals tend to be in certain groups, and the groups they are in then may affect the individuals, including by influencing their choices to be in certain groups.

Methodological Issues

In the present study, a large amount of basic data was gathered in an ecologically valid play situation where children were free to choose their play partners. The rates of social behaviors seen were comparable to those reported in previous studies in the literature about preschoolers

(see e.g. Eckerman, Whatley, & Kutz, 1975; Eisenberg, Tryon & Cameron, 1984; Holmberg, 1980; Mueller, 1979; Parten, 1932; Roper & Hinde, 1978; Rubin, Maioni & Hornung, 1976; Smith & Connolly, 1972). Most importantly, this study was one of few to compare peer interaction in naturally-occurring rather than artificially-created peer groupings. The children themselves were free to create the peer groupings.

A possible limitation of the present research was the way social behaviors were sampled. Only one category of behavior was coded per ten-second interval: usually the one occurring for the longest duration. Thus it is possible that behaviors that tend to be of short duration were under-represented. An attempt was made to anticipate this possibility by allowing rarely occurring-interactions (such as "show") to be coded whenever they occurred, no matter how briefly. It is hoped that this strategy may have managed the possible sampling bias.

Another possible limitation is that in the present research only two categories of group size, dyads and gatherings containing three or more children, were constructed. An attempt was made to create a triadic category in the present study, however, there was insufficient data to maintain this division. It is possible, as implied below in the discussion of group size and development, that as soon as there are more than two

young preschoolers together, rate of social interaction decreases dramatically. On the other hand, a linear relationship between social interaction and group size is conceivable, such that the larger the group, the fewer interactions there are. In the present study, groups of all sizes were combined so the nature of the relationship between group size and social interaction remains unclear.

In addition, in the present study, the average size of same- vs. mixed-gender groups was not compared so it is not known whether they were of equal sizes or whether one was larger. If mixed-gender groups were, on average, larger than same-gender groups, it is possible that the effect of more watching in mixed-gender groupings is partly due to an effect of group size. Future studies might attempt to examine the relationship between group size and social engagement in a more fine-grained manner than in the present research.

From a methodological point of view, the social interaction categories would benefit from modifications in planning future studies. Initially, it was thought that it would be fruitful to attempt to capture many different kinds of possible interaction. The net result, however, was that each type of engagement occurred rarely, so data ended up being aggregated. In future investigations on same- vs. mixed-gender groupings, it may be more useful to begin with a few summary categories, such as parallel and interactive

engagement. Then, subclassifications within these categories could be constructed, for example using cognitive (e.g. constructive, dramatic) as well as social (e.g. parallel, interactive) dimensions (e.g. see Rubin, Maioni, & Hornung, 1976).

The cognitive dimension emphasizes the cognitive complexity of play and object use. For example, constructive play describes the sort of play often seen with blocks or sand when children create or build things. Dramatic play describes play in which imagination is often involved, with children acting out roles or fantasies.

Each social category (e.g. interactive) could be subdivided along the cognitive dimension, yielding subcategories such as constructive interactive and dramatic interactive (see Urberg & Kaplan, 1989 for similar categories). These subcategories might capture more subtle patterns of interaction than the categories in the present research. For example, the current study did not reveal any coherent pattern of results with parallel play: it may have done so had the categories been more refined. No differences in type of interaction were found between male and female dyads. It is possible that differences would have been found had there been, for example, an analysis of dramatic themes in boy vs. girl groupings.

Future studies on the nature of same-gender group compatibility should also include information about the

"success" (i.e. continued interaction) or "failure" (aborted interaction) of social attempts. For this sort of data analysis, data must be coded in the form of interaction sequences, where one notes the action of one peer and the reaction of another (see e.g. Fagot, 1985a; La Freniere, Strayer, & Gauthier, 1984 for clear examples of data structured in this way). Success vs. failure of interaction has been examined when, for example, questions about conflict in preschoolers have been addressed (e.g. Laursen & Hartup, 1989). Studying when and with whom social attempts fail or succeed could provide further information on the contexts facilitating or inhibiting compatibility between peers. Success, or sustained interaction, could be assumed an index of interactive compatibility.

Towards an Understanding of Same-Sex Compatibility

The above results concerning same-sex compatibility suggest that there is something about same-gender dyads which engenders or permits close interaction. As well, there is something about mixed-gender groupings that either engenders more distal interactions, or inhibits close interaction.

The question of compatibility must be contemplated. Many different phenomena would contribute a partial explanation to this question. For example, as discussed in the introduction, children of the same gender often share sex-typed interests. This discussion will attempt to focus

on possible social interactional processes which might lead to same-sex compatibility.

Studies of "dominance relations" in people ranging in age from toddlerhood to adulthood have shown that males tend to dominate females when interacting in mixed-gender pairs or groups. It has been suggested (e.g. Maccoby & Jacklin, 1987) that male dominance causes females to avoid males. Dominance has been measured in a variety of ways. For example, the sexes have been found to differ in influence styles (Serbin, Sprafkin, Elman & Doyle, 1982), with toddler boys more successful than toddler girls in assertive bids (Lloyd & Smith, 1986), and preschool boys giving more imperatives to girls than to other boys or than vice versa (Phinney & Rotheram, 1982). Some researchers have found greater utilization of a resource by boys than girls in preschoolers (Charlesworth & La Freniere, 1983; Powlishta & Maccoby, 1987). Studies of peer perceptions of elementary schoolers have found peers to perceive boys as "tougher" (Omark, Omark, & Edelman, 1975) or more leader-like (Lockheed, Harris & Nemcoff, 1983) than girls. It has been observed that males speak and are listened to more than females (groups of adults - Aries, 1976; groups of junior high schoolers - Webb, 1984; Webb & Kenderski, 1985; groups of elementary schoolers - Wilkinson, Lindow & Chiang, 1985).

Maccoby (e.g. 1988) has very coherently explained how the nature of dominance relations among and between the

sexes may cause girls to avoid boys because girls become increasingly less able to influence boys. She feels people have a fundamental need to be able to influence others and control interactions to a certain extent, and girls will certainly avoid boys if they cannot influence them effectively. Although much of the evidence cited above concerns children (and adults) older than those in the present research, a "dominance" explanation of "incompatibility" could still apply to young children.

A "dominance" explanation could possibly apply to the result of more watching, a distal social behavior, in mixed-gender than same-gender groupings in the present study. However, this explanation would apply more to girls than to boys and in the present research no sex difference was found. In addition, further research would need to explore, for example, the function of watching in toddler peer social groups.

However, there is still much to be explained. Maccoby (1988) admits for example that a dominance explanation does not clarify why boys would avoid girls if they are able to influence them. Also, an explanation is still needed for the phenomenon of same-sex attraction, particularly in the dyadic situation.

The strong desire to be with same-gender others has often been explained by the development of gender identity. Kohlberg (1966) conceptualized a developmental sequence

whereby children first learn to reliably identify their own sex, that is, they acquire gender identity. Next, they grow to understand that they will remain the same sex when they are adults. Kohlberg termed this understanding "gender stability." Slaby and Frey (1975) and Kuhn, Nash & Brucken (1978) have considered gender stability to also include the understanding that gender is constant, even if one wants to be the other sex. In the last stage, children are able to understand that they cannot change to the other sex even if perceptual changes occur: for example, they cannot change even if they wear clothing sex-typed for the opposite sex. Kohlberg termed this understanding "gender consistency." Gender identity is both the term associated with the first level of this developmental sequence and a term (along with gender constancy) given to the entire sequence, that is, the concept as a whole.

In the toddler/preschooler period, children are rapidly and actively developing gender identity (e.g. see Fagot, 1985b; Huston, 1983; Martin & Halverson, 1983). Kohlberg (1966) theorized that gender identity is the central organizer of gender-based information and preferences. There is limited evidence for this point of view. Some studies have indicated that children with gender identity play with same-gender peers more frequently than children without gender identity do (Fagot, 1985b; Fagot, Leinbach, & Hagan, 1986).

Because of a developing sense of gender identity, children may be more attracted to same-gender peers than other-gender peers. Interacting with same-gender peers may in turn foster a child's own gender identity. A gender identity explanation focuses on individually-oriented factors which play a role in sex-typed socialization in general and gender segregation in particular. Variations in gender identity may be one of the factors explaining the results that some children prefer same-gender groupings more than others.

Nevertheless, the development of gender identity which may motivate children to be with same-gender peers, may also provide them with a context - interaction in a same-gender grouping - which provides a socializing function. In other words, once involved in a same-gender grouping, the grouping itself may create a context which generates a special experience of "togetherness." This experience may be rewarding because it further fosters the development of gender identity. The same-gender peer grouping may also be particularly rewarding at a specific point in development when the world of peers is beginning to be attractive (e.g. Hartup, 1989). For children actively developing a sense of gender identity, and having newly discovered the joys of the world of peers, interaction in a same-gender grouping may generate a sense of exclusivity, an "in-group" experience. In addition, the more children are with same-gender others,

the more opportunities there may be for interaction to become increasingly intimate, and more rewarding.

To clarify the relationship between gender identity and group composition with respect to social engagement, it would be interesting to conduct a study comparing the frequency of interactions in same- and mixed-gender groupings, which also examined the role of gender identity development. Although, they did not specifically study this relationship, Smetana and Letourneau (1984) found that girls with gender stability (as measured by the Slaby & Frey (1975) Gender Constancy Interview) engaged in more same-gender social interaction than other females.

The above explanation regarding the role of the same-gender peer group do not explain the results of the present study concerning same-sex compatibility only in the dyadic situation. The situation of the dyad must be considered.

There has been limited research on the effect of group size on social interaction in young children. Vandell and Mueller (1977) found that for toddlers the dyadic situation was more facilitative of interaction than were larger groups. Urberg and Kaplan (1989) found that for preschoolers, the size of play groups occupied in parallel play was significantly larger than the size of play groups occupied in interaction. Mueller (1979) has suggested that the dyadic context may provide fewer interrupting influences than other contexts, allowing toddlers with fledgling social

skills the opportunity to use those skills without getting distracted. Groups might generate too many stimuli for toddlers to be able to sustain interactions. The results of more watching in groups than in dyads obtained in the present study may also indicate that something inhibits interaction in groups.

Mueller's (1979) suggestion implies a developmental process such that interaction may first occur in dyads, and later in development in larger groupings, as children's social skills increase. It is known that with age, children are increasingly more able to initiate, coordinate and sustain social interaction as well as engage in it with increasing frequency (see e.g. Eckerman, Whatley & Kutz, 1975; Holmberg, 1980; Howes, 1987). Most of the research on the development of social ability has defined and studied interaction as it occurs in a dyad. The issue of dyadic vs. group interaction has been virtually ignored.

Applying Mueller's (1979) suggestion to the present results, one could speculate that dyadic interaction may be a precursor to group interaction. One could then speculate that same-sex dyadic compatibility may be a precursor to same-sex group compatibility. In other words, with age, in addition to higher levels of interaction in same-gender dyads than mixed-gender dyads, one might also observe higher levels of interaction in same-gender groups than mixed-gender groups: that is, gender segregation.

It is possible that the children observed in the present study were not yet developed enough to sustain interactions in groups. A study similar to the present one, expanding the age range studied and comparing different age groups, could be done to examine the effect of age on interaction in various groupings. A cross-sectional study which observed several groups of three-and-a-half to four year olds in addition to several groups of three-year-olds could examine age differences in the level of social interaction in groups. Another useful approach would be a short-term longitudinal study, following several cohorts for at least two years - as they turned three, and as they turned four. Informal observation of the older children who were playmates of the target subjects in the present study yielded the impression that they were able to sustain interactions in groups, often by playing games and engaging in fantasy play.

Another interesting approach would be to compare group compositions as they occurred in same-age groupings, and in mixed-age groupings of children aged three to four, or even three to five, examining the effect of age. It is possible that environments with older children, presumably with more social skills and more developed gender identity, may prove facilitative of interaction in same-gender groupings. Older children may be more influential in determining the sorts of interactions which occur (see Goldman, 1976; Lougee,

Grueneich & Hartup, 1977). On the other hand, it may be, as Urberg and Kaplan (1989) have found, that interactive behaviors are often found in homogeneous groups, whether gender- or age-homogeneous.

In such studies, definitions of interaction may have to be more complex than the definitions in the present study which considered an action on the part of one child to another who was clearly responsive. For example, in a group situation, it is possibly that two children may be talking only to each other at a particular moment, but that nevertheless this interaction is a small part of a larger one which includes other children. There may be a framework (e.g. a game) which connects several children even if they are not all interacting with each other at a given moment.

Interaction in groups is not necessarily more "mature" than dyadic interaction. There are many possible factors influencing the size of the group in group interactions. It is thought, however, that choosing to interact in a same-gender dyad (as elementary-school-aged girls tend to do more than same-aged boys (Hartup, 1983; Maccoby and Jacklin, 1987)) may have a different meaning when one is capable of interacting in a group situation than when one is not.

To summarize, the major finding of the present study was that there were significantly more interactions in same-gender dyads than in mixed-gender dyads during free play in the young preschool classes which were observed. It is

possible that in the early preschool period, the dyadic gender-homogeneous situation may provide a context in which children who are beginning to interact efficiently with peers can mirror each other and facilitate each other's developing sense of gender identity. Interaction in the dyadic context may also provide children with a sense of "togetherness" which may be so rewarding that gradually this context is sought more and more. Perhaps as children become more adept at social interaction, and become more mature in general, same-gender interaction may occur beyond the dyadic situation. Gradually, gender segregated groups may become the predominant context of social interaction.

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APPENDIX A

Addendum to Results

Group Composition

In final analyses, group composition cells with reasonable amounts of data were retained. These consisted of four cells, comprised of two dimensions (size and gender): same-gender dyads, mixed-gender dyads, same-gender groups, and mixed-gender groups. After initial examination of the data, plans for analysis had to be curtailed. Initially, multiple levels of size and gender were to be examined. With respect to size, triads were to be examined separately from larger groups. With respect to gender, opposite-gender groups, that is sex-homogeneous groups except for one child were to be analyzed separately from mixed-gender groups (as Maccoby and Jacklin (1987) did). However, there was not sufficient participation to warrant maintenance of so many cells.

The four cells of group composition were calculated in several stages. First, the number of times in each type of group (i.e. raw frequency) was calculated. Then scores were adjusted for two influences: (a) class sex ratio and (b) differing number of total observations for each child.

Class sex ratio. Two of the five classes had approximately equal numbers of boys and girls present each day. In three classes, there were almost always more boys than girls; often 1 1/2 times more, sometimes twice as many (in one class, two sessions were deleted which had a ratio of approximately 4:1 boys:girls). In order to get a

meaningful answer to the question "were children in mixed-gender groups equally as often or more often than in same-gender groups?", scores were adjusted to reflect the sex ratio in attendance in order to be more accurate or more conservative indicators of group assortment. Therefore, the average number of boys and girls present in each class (averaged over the sessions we videotaped) was used to weight the group composition scores. Table A-1 shows the average number of boys and girls in each class (see Table A-1), including those who were not subjects (but who were available as peers with whom to interact).

Weights were calculated in the following manner. For same-gender variables (that is, same-gender dyads and same-gender groups), the group composition score (e.g. number of times in a same-gender dyad) was divided by the probability of being in a same-gender grouping. For boy subjects this probability was:

$$\frac{\text{(number of boys - 1)}}{\text{((number of boys -1) + number of girls)}}$$

For girl subjects, substitute the word "girl" where boy occurs.

For mixed-gender variables, the group composition score (e.g. mixed-gender dyad) was divided by the probability of

being in a mixed-gender grouping. For boy subjects this probability was calculated as follows:

$$\frac{\text{number of girls}}{(\text{number of girls}) + (\text{number of boys} - 1)}$$

Although these probabilities are not complete, in that, for groups they do not account for each subsequent choosing of a peer after the first one, the preceding was seen as a relatively simple but sufficient solution to the problem of uneven sex ratio.

Number of observations per child. The weighted group composition scores were divided by the total number of observations (which varied from child to child), then were multiplied by 100, to yield a final weighted percentage score. These scores were used in a repeated measures analysis of variance to determine whether gender segregation was present.

Examining assumptions underlying repeated measures analyses of variance

In order to perform repeated measures analyses, the variables used had to be examined to determine whether they were suitable for this sort of analysis. Underlying most conventional statistical tests is the assumption that the variables being used are normally distributed. If variables

are not normal, some sort of transformation is often required: the need to transform variables is common in observational research. Therefore, the normality of all variables was investigated. Histograms of each variable were plotted to visually examine the distributions. It was examined whether variables were significantly skewed, and whether there was significant kurtosis. Tabachnick and Fidell (1989) recommend that only a significance level of $p < .001$ (or $Z = 3.67$) or less need be of concern. Finally, expected normal probability plots and detrended expected normal probability plots were obtained. In these plots, expected normal values and obtained normal values are compared (Tabachnick & Fidell, 1989).

Statistical tests such as repeated measures analysis of variance are sensitive to the presence of outliers, or subjects with extreme scores on variables. Therefore, in addition to the normality of variables, each variable was examined for the presence of outliers, separately by cell (that is, for boys and girls separately). As Tabachnick and Fidell recommend (1989), outliers were checked by examining the frequency histograms, plotted for each sex (i.e. each cell) separately to see if any score(s) were strikingly far from the rest, and by computing z scores for each variable and examining if there were any scores much greater than 3.

Multivariate normality, another assumption underlying repeated measures analysis of variance, is difficult to test

directly. Generally, if there is univariate normality for each variable (examined as described above), and if there are close to 20 subjects in the smallest cell (even if the cell sizes are unequal), multivariate normality is assumed as long as small variations in univariate normality are due to skewness and not to the presence of outliers (Tabachnick & Fidell, 1989).

Underlying repeated measures analysis of variance with between-factors in addition to the within factors are two assumptions known collectively as "compound symmetry." The first is the assumption of homogeneity of variance-covariance matrices for all levels of between-subject factors (in the present study, sex of child). The second is the assumption of 'sphericity' or that each level of a given dependent variable correlates approximately equally with each other level. The assumption of 'sphericity' only applies when there are more than two levels of each dependent variable, which is not the case here. Thus, in the present study, only the homogeneity of variance assumption applies; the assumption of sphericity does not apply because there are only two levels of each dependent variable (that is, two of group gender and two of group size).

Gender Segregation Analysis. The assumptions underlying this analysis were investigated by examining the four variables of group composition which were: adjusted

frequency of same-gender dyads, adjusted frequency of mixed-gender dyads, adjusted frequency of same-gender groups, and adjusted frequency of mixed-gender groups. One outlier was revealed for same-gender groups, and one for mixed-gender groups, both in the boy's cell. Probably due to the presence of the outliers, there was significant kurtosis in the distribution of each variable (for same-gender groups, $Z_k = 4.03$; for mixed-gender groups, $Z_k = 8.59$, $p < .001$) and close to significant skewness (for same-gender groups, $Z_s = 3.60$, for mixed-gender groups, $Z_s = 3.58$, $p < .01$).

As Tabachnick and Fidell (1989) recommend, the scores of the outliers were changed so that they wouldn't exert undue influence on the distributions. They were modified so that they would still reflect the score's deviation: each one was changed to two units greater than the next greatest score. For same-gender groups, the mean score was 21.16 (SD = 14.50), the next to highest score was 46.30, and the outlier had a score of 76.25[1]. For mixed-gender groups, the mean scores was 75.25 (SD = 23.39), the next to highest score was 103.67, and the outlier had a score of 176.80. For same-gender groups, the outlier's score was changed to 48.30, yielding a mean of 20.65 (SD = 12.93). For mixed-gender groups, the outliers score was changed to 105.67, yielding a mean of 73.95 (SD = 19.27). Skewness and

[1]Note that because these scores were weighted by the class sex-ratio, they are not in and of themselves independently meaningful scores.

kurtosis for both variables no longer significantly varied from normal. Bartlett's Box's M test of homogeneity of the variance-covariance matrix was not significant at $p < .001$ (Box's $M = 23.849$, $p = .016$: Tabachnick & Fidell recommend this conservative significant level because Box's M is an oversensitive test) therefore no violation of homogeneity of variance was seen.

Social Engagement Analyses. Ideally, in classical repeated measures analyses, all subjects contribute equally to all conditions. In the present study, subjects contributed at different rates to different group compositions. Some children did not contribute any data to certain conditions. For example, some children were never in same-gender groups. Clearly, these children could not be retained for analyses since of course they could never display a social behavior in that condition, and thus their behavior across group compositions could not be compared. Therefore, all children with 0's in any 1 of the four group composition were deleted from the current analyses.

To further ensure that a minimum amount of data was contributed, a rule of thumb was applied. This was that since three social categories were examined, children had to contribute to each group composition at least three times. In this way, there was the possibility of having each social category (e.g. parallel) in each group composition (e.g. same-gender dyad). Of course many children contributed

considerably more than this minimum. Using this rule of thumb, 17 subjects were deleted. Thirty-eight subjects were retained for analyses.

Twelve of the seventeen deleted subjects were observed in the first year of the study. Since the first year yielded on average less total data per subject ($\underline{M}$ = 52.2 observations in the first year, $\underline{M}$ = 99.3 observations in the second year), it is likely that it also yielded correspondingly fewer observations in each group composition. Therefore, subjects from the first year were more likely than subjects from the second year to have insufficient observations in each group composition.

Deleted subjects were equally represented among the sexes: Nine were males and eight were females. Three subjects spent virtually no time in same-gender groupings. Most deleted subjects, however, had similar patterns of participation in group compositions to retained subjects, for example, with much time spent in mixed-gender groupings, and less time in other groupings. However, they did not participate sufficiently in at least one type of grouping and therefore were not included in data analyses. In other words, the group composition data of deleted subjects seemed to differ quantitatively rather than qualitatively from the data of retained subjects.

Parallel play behavior. The assumptions underlying this analysis were investigated by examining the four

variables which were: the number of times in parallel play while in same-gender dyads divided by total frequency of same-gender dyads, number of times in parallel play while in mixed-gender dyads divided by total frequency of mixed-gender dyads, number of times in parallel play while in same-gender groups divided by total frequency of same-gender groups, and number of times in parallel play while in mixed-gender groups divided by total frequency of mixed-gender groups. No outliers were discovered for any variable, neither for boys or girls. All the variables were approximately normally distributed. Bartlett's Box's M test of homogeneity of the variance-covariance matrix was not significant at $p < .001$ (Box's $M = 6.63$, $p = .83$). Therefore, no violation of homogeneity of variance was seen.

Watching. The assumptions underlying this analysis were investigated by examining the four variables which were: the number of times watching occurred while in same-gender dyads divided by total frequency of same-gender dyads (SGDYWAT), number of times watching occurred while in mixed-gender dyads divided by total frequency of mixed-gender dyads (MGDYWAT), number of times watching occurred while in same-gender groups divided by total frequency of same-gender groups (SGGWAT), and number of times watching occurred while in mixed-gender groups divided by total frequency of mixed-gender groups (MGGWAT).

SGDYWAT was found to be significantly positively skewed

(Z_s = 4.02, p < .001). There were no outliers, therefore the presence of outliers was not the cause of the skewness. Because of this severe positive skew, a log transformation was performed, resulting in a variable which was reasonably normally distributed (Z_s = 3.31, p > .001). In order to be able to compare SGDYWAT - transformed with the other variables (i.e. MGDYWAT, SGGWAT, MGGWAT), the other variables underwent log transformations as well. In all cases, approximately normal distributions were found. Bartlett's Box's M test of homogeneity of the variance-covariance matrix was not significant at p < .001 (Box's M = 9.74, p = .576). Therefore, no violation of homogeneity of variance was seen.

Social interactions. The assumptions underlying this analysis were investigated by examining the four variables which were: the number of times in interaction (either social or agonistic) while in same-gender dyads divided by total frequency of same-gender dyads, number of times in interaction while in mixed-gender dyads divided by total frequency of mixed-gender dyads, number of times in interaction while in same-gender groups divided by total frequency of same-gender groups, and number of times in interaction while in mixed-gender groups divided by total frequency of mixed-gender groups. No outliers were discovered for any variable, neither for boys or girls. All the variables were approximately normally distributed.

Bartlett's Box's M test of homogeneity of the variance-covariance matrix was not significant at $p < .001$ (Box's $M = 13.52$, $p = .295$). Therefore, no violation of homogeneity of variance was seen.

School Differences

Three repeated measures analyses of variance were performed, one examining gender segregation, the second on social interactions within group composition, and the third on parallel play behaviors within group composition. In other words, the three main analyses were performed, however, each with class as a between-subjects variable, and with group size and group gender as a within-subjects variable. There were five classes: (a) RB 1st year, (b) St.A 1st year, (c) RB 2nd year, (d) St.A 2nd year morning class, and (e) St.A 2nd year afternoon class. There were insufficient subjects to run sex as an additional between-subjects factor.

The gender segregation analysis revealed a significant main effect of class, $F(4,50) = 4.60$, $p < .01$, a significant interaction between class and group size, $F(4,50) = 3.28$, $p < .05$, and a significant class by group gender interaction, $F(4,50) = 6.70$, $p < .001$. Probably because there were five different classes, post hoc t-tests comparing variable means from different classes did not reveal any clear patterns explaining this interaction. Classes varied seemingly randomly in terms of group

composition frequency patterns. There was no class, for example with the highest score on every group composition, or high scores on same-gender groupings and low scores on mixed-gender groupings, or vice versa. In other words, there was no logical pattern. Post-hoc t-tests comparing group composition means within classes revealed that all five classes showed one pattern shown by the subjects all grouped together: lower scores for same-gender groups compared to mixed-gender groups. Three of the five classes (St.A Y1, RB Y2, and St.A Y2 Pm) also had more same-gender dyads than mixed-gender dyads while the other two classes (RB Y1 and St.A Y2 Am) showed no significant difference between these two groupings.

The analysis investigating parallel play behaviors by group composition did not reveal a main effect of class, nor did class interact with group size or group gender.

The analysis investigating social interactions by group composition did not reveal a main effect of class, nor did class interact with group size. However, there was a significant interaction between class and group gender, F (4,33) = 2.74, $p < .05$. Post-hoc t-tests for correlated samples revealed that SA-PM Y2 had a higher number of social interactions in same-gender groupings (M = 0.68) than SA-AM Y2 (M = 0.34), t (14) = -2.92, $p < .02$, and than RB Y1 (M = .35), t (11) = -2.56, $p < .05$. Also, RB Y1 had a higher number of interactions in mixed-gender groupings (M = 0.55)

than SA-AM Y2 (M = 0.30) t (13) = 2.46, p < .05. Since there were 10 post-hoc comparisons between schools, these cannot be considered statistically significant: nor are they psychologically meaningful.

Table A-1

Average Attendance of Boys and Girls in Each Class

Class	Boys	Girls	Ratio[a]
St.A, Y1	4.94 (6)	3.33 (4)	1.48:1
RB, Y1	12.56 (28)	7.38 (14)	1.70:1
St.A, Y2 - A.M.	12.57 (15)	11.67 (15)	1.08:1
St.A, Y2 - P.M.	13.50 (17)	12.97 (14)	1.04:1
RB, Y2	14.16 (23)	9.47 (18)	1.50:1

Note: Numbers in brackets represent the number of children registered.

[a] : The ratio is the number of boys attending to number of girls attending.

Table A-2

Assertive Interactions by Group Composition: Means (Percentages) and Standard Deviations

Group Composition	Mean (SD)
Same-gender dyads	
Males	0.04 (0.07)
Females	0.03 (0.07)
Both Sexes	0.04 (0.07)
Mixed-gender dyads	
Males	0.03 (0.07)
Females	0.05 (0.07)
Both Sexes	0.04 (0.07)
Same-gender groups	
Males	0.003 (0.01)
Females	0.04 (0.10)
Both Sexes	0.02 (0.07)
Mixed-gender groups	
Males	0.05 (0.06)
Females	0.03 (0.03)
Both Sexes	0.04 (0.05)

Note: N = 38: 17 males and 21 females.

Table A-3

Descriptions of the Social Engagement Categories: Mean Percentages and Standard Deviations

Variable by sex of subject	Mean (SD)
In transition	
Males[a]	2.88 (2.35)
Females[b]	2.96 (2.27)
Wandering	
Males	2.91 (2.15)
Females	3.91 (3.40)
Unoccupied	
Males	3.39 (3.51)
Females	4.34 (4.01)
Crying	
Males	0.00
Females	0.22 (0.80)
Storytelling with teacher	
Males	0.24 (0.58)
Females	0.98 (1.69)

[a] n = 17

[b] n = 21

Table A-3 - continued (page 2)

Descriptions of the Social Engagement Categories: Mean Percentages and Standard Deviations

Variable by sex of subject	Mean (SD)
Ask teacher for help	
Males	0.98 (1.15)
Females	1.12 (1.89)
Talk to teacher	
Males	2.07 (2.17)
Females	2.61 (2.13)
Other teacher interaction	
Males	6.55 (5.85)
Females	6.59 (4.20)
Solitary Play	
Males	13.55 (8.70)
Females	9.44 (4.27)
Parallel Play	
Males	30.31 (10.77)
Females	30.50 (10.43)

Table A-3 - continued (page 3)

Descriptions of the Social Engagement Categories: Mean Percentages and Standard Deviations

Variable by sex of subject	Mean (SD)
Watch	
Males	15.16 (7.91)
Females	16.27 (8.82)
Help	
Males	0.29 (0.74)
Females	0.09 (0.39)
Initiate	
Males	0.28 (0.65)
Females	0.38 (1.13)
Cooperation	
Males	8.30 (5.28)
Females	8.48 (6.08)
Affection	
Males	0.00
Females	0.16 (0.40)

Table A-3 - continued (page 4)

Descriptions of the Social Engagement Categories: Mean Percentages and Standard Deviations

Variable by sex of subject	Mean (SD)
Ask peer for help	
Males	0.17 (0.49)
Females	0.26 (0.50)
Show	
Males	0.41 (0.77)
Females	0.68 (0.94)
Conversation	
Males	4.95 (4.52)
Females	5.48 (4.17)
Give toy	
Males	0.16 (0.47)
Females	0.44 (0.82)
Receive toy	
Males	0.26 (0.49)
Females	0.09 (0.28)

Table A-3 - continued (page 5)

Descriptions of the Social Engagement Categories: Mean Percentages and Standard Deviations

Variable by sex of subject	Mean (SD)
Try to take toy	
Males	0.17 (0.49)
Females	0.20 (0.51)
Take toy	
Males	0.51 (0.90)
Females	0.41 (0.62)
Object struggle	
Males	1.70 (1.93)
Females	1.22 (2.01)
Aggression	
Males	0.34 (0.58)
Females	0.13 (0.43)
Play hit	
Males	0.22 (0.71)
Females	0.00

Table A-3 - continued (page 6)

Descriptions of the Social Engagement Categories: Mean Percentages and Standard Deviations

Variable by sex of subject	Mean (SD)
Rough and tumble	
Males	0.55 (0.94)
Females	0.49 (0.81)
Imitate	
Males	0.89 (1.38)
Females	0.49 (0.81)
Approach	
Males	1.82 (1.87)
Females	1.57 (1.61)
Withdraw	
Males	0.44 (0.75)
Females	0.11 (0.34)
Have toy taken away	
Males	0.50 (0.90)
Females	0.39 (0.60)

APPENDIX B

Statistical Tables B-1 to B-7

Table B-1

Repeated Measures Analysis of Variance: Gender Segregation

Source	df	Mean Square	F
Sex (of subject)	1	45.49	.37
Error between	53	122.04	
Group size	1	27727.40	96.87*
Sex * Group size	1	386.88	1.35
Error within (size)	53	286.22	
Group gender	1	24599.10	50.04*
Sex * Group gender	1	102.45	.21
Error within (gender)	53	491.64	
Group size * Group gender	1	56575.64	622.79*
Sex * Group size * Group gender	1	112.05	1.23
Error within (size * gender)	53	90.84	

Note: N = 55 (26 boys, 29 girls)

*p < .001

Table B-2

Repeated Measures Analysis of Variance: Parallel Play

Source	df	Mean Square	F
Sex (of subject)	1	.01	.21
Error between	36	.07	
Group size	1	.02	.61
Sex * Group size	1	.00	.02
Error within (size)	36	.03	
Group gender	1	.00	.00
Sex * Group gender	1	.01	.41
Error within (gender)	36	.03	
Group size * Group gender	1	.06	2.55
Sex * Group size * Group gender	1	.11	4.21*
Error within (size * gender)	36	.02	

Note: N = 38 (17 boys, 21 girls)

*p < .05

Table B-3

Repeated Measures Analysis of Variance: Watching

Source	df	Mean Square	F
Sex (of subject)	1	.00	.02
Error between	36	.00	
Group size	1	.02	7.42*
Sex * Group size	1	.00	.05
Error within (size)	36	.00	
Group gender	1	.01	4.24*
Sex * Group gender	1	.00	1.01
Error within (gender)	36	.00	
Group size * Group gender	1	.00	.61
Sex * Group size * Group gender	1	.00	1.04
Error within (size * gender)	36	.00	

Note: N = 38 (17 boys, 21 girls)

*$p < .05$

Table B-4

Repeated Measures Analysis of Variance: Social Interactions

Source	df	Mean Square	F
Sex (of subject)	1	.00	.08
Error between	36	.05	
Group size	1	.16	13.71**
Sex * Group size	1	.00	.01
Error within (size)	36	.01	
Group gender	1	.20	5.82*
Sex * Group gender	1	.03	.86
Error within (gender)	36	.03	
Group size * Group gender	1	.21	11.93**
Sex * Group size * Group gender	1	.03	1.58
Error within (size * gender)	36	.02	

Note: N = 38 (17 boys, 21 girls)

* $p < .05$

** $p < .001$

Table B-5

Repeated Measures Analysis of Variance: Social Interactions - Subjects with Dyadic Relationships Removed

Source	df	Mean Square	F
Sex (of subject)	1	.00	.00
Error between	27	.04	
Group size	1	.10	7.38*
Sex * Group size	1	.00	.00
Error within (size)	27	.01	
Group gender	1	.01	.50
Sex * Group gender	1	.01	.21
Error within (gender)	27	.02	
Group size * Group gender	1	.14	7.83**
Sex * Group size * Group gender	1	.00	.02
Error within (size * gender)	27	.02	

Note: N = 29 (12 boys, 17 girls)

* $p < .05$

** $p < .01$

Table B-6

T-Tests: Comparing the Means of Male Dyads to Female Dyads on Selected Social Engagement Categories

Social Engagement	df	t
Cooperative Play	36	.83
Peer Conversation	36	-.06
Object Struggles	36	1.07
Rough and Tumble	36	-.22

Note: N = 38 (17 boys, 21 girls)

Table B-6

T-Tests: Comparing the Means of Male Dyads to Female Dyads on Selected Social Engagement Categories

Social Engagement	df	t
Cooperative Play	36	.83
Peer Conversation	36	-.06
Object Struggles	36	1.07
Rough and Tumble	36	-.22

Note: N = 38 (17 boys, 21 girls)

Table B-7

T-Tests: Comparing the Means of Male Groups to Female Groups on Selected Social Engagement Categories

Social Engagement	df	t
Cooperative Play	36	.20
Show	36	-.32
Peer Conversation	36	.40
Object Struggles	36	-1.25

Note: N = 38 (17 boys, 21 girls)

APPENDIX C

C O D I N G M A N U A L

Gender Segregation Study

Updated: August, 1988

Table of Contents

Introduction to the Code.

This behavioral code guides the coder in making judgements about the videotaped intervals he or she views. Expect to view a given interval approximately 3 to get all the information necessary.

Keep in mind the following goals when coding:

(1) VIEW THE SITUATION FROM THE PERSPECTIVE OF THE TARGET CHILD

(2) ORIENT THE CODE AROUND THE SOCIAL ENGAGEMENT CATEGORY: ALL OTHER CATEGORIES ARE ORIENTED AROUND THE SOCIAL ENGAGEMENT BEHAVIOR CHOSEN.

(3) TARGETS ARE CODED IN THE SOCIAL ENGAGEMENT BEHAVIOR WHICH OCCURS FOR THE LONGEST TIME IN THE 10-SECOND INTERVAL.

Definitions of the Code Variables

NAME

This column is for the name, initials, or i.d. number of the target child.

TOY

This column is for the toy(s) being used by the target child. S e Table C-1 with the list of codes for the various toys employed in the present study. Attempt to fit new

toys, or those rarely seen, into existing categories. The child has to actually have, hold, or use the toy, not just, for example, give it a "passing by" touch.

NOTE: The toy does not have to be related to the social engagement category to be coded (e.g. a target child may be talking to a peer, while clutching a toy: the toy would still be coded).

NOTE: A child may be using more than one toy. Only code the extra toy(s) if they are being used together at the same time. In most cases, only one extra toy is coded. If a child is carrying a "transitional object", this is coded as a toy. Do not code more than 3 toys (very rare).

GROUP COMPOSITION

This column contains the I.D. numbers of the children of each sex in the proximity of the target child. A child is not considered a group member if he/she is not within 5 feet of the target, or has his/her back to the target, or if the target has his/her back to the peer(s). If a peer is just "passing by" for a few seconds (and is not there at the halfway mark -see DISTANCE), s/he is not coded. There are several exceptions to these rules, as follows:

(a) When a target child is **watching** others, those other children can be coded if their backs are to the target. However, they are not included if they are more than 5 feet away.

(b) The 5-foot rule and the "back" rule do not apply if the distance between children is externally structured: e.g. if people are lined up in a row, or at a table. Being at a table is a common situation: in general, all the children at the same table are considered as part of the same group.
(c) If two (or more) children are "invisibly" linked, the rules do not apply. For example, if two children are chasing each other, both the chaser and the chasee are considered as part of the same group. Generally stated, if two children are interacting (including shouting across the room to each other) they are coded as in the same group.

To a certain extent, this category requires some judgement calls.

CODING SIMPLIFICATION:

If there are no people in a subcolumn, e.g. males, mark "0." This will minimize possible errors. For example, if a target child is with 1 girl mark a "0" in the male subcolumn.

TEACHER

In this column, one notes (with a checkmark or a 0) whether the teacher(s) is (are) present or absent. We are more "generous" when coding teacher presence than when coding peer presence: the teacher can be there for only a few seconds, and her back can be to the child. In general, the teacher is coded as present if she is there at all

(except if she just walks quickly by).

DISTANCE

This column contains the ID #'s of the 3 children who are interacting with or physically closest to the target child.

Distance is judged as it occurs at the 5th second of the interval. Freeze-frame the interval, and code that. If the 5th second happens to be a closeup, and thus no (or only some) other children are in view, judge distance from the nearest forward camera "pan" (as long as it remains within that 10-second interval) as well as by what you see at the 5th second.

If the social engagement is a brief "special status" one (see social engagement), code distance at the time of the social engagement, which may NOT necessarily include the 5th second.

When there is <u>interaction,</u> the child with whom the target is interacting is always marked first, no matter how far they are from the target. If there are more than 1 child interacting with the target, choose the order using distance (i.e. the closest child is first, next closest is second, farthest child is third), or, choose first the principal interactor, if there is one.

If the target child is not interacting with anyone, select, at the 5th second, the 3 children who are the

physically closest to the child, if the distance between children is obvious (which it rarely is). Be aware that the camera plays tricks with distance! When there are children who are approximately an equal distance from the target (as is frequently the case), use the "left, right, across" rule. Code the peer to the target's immediate left as first, on the target's immediate right as second, and across as third. Then go second left, second right, across left, across right, and so on. Use the following examples as guidelines:

Example:

A target is at a table with two children on his left, none on his right, and one across from him, not directly across, but to the right.

Distance is as follows: The peer to his immediate left is first. There is no one to the immediate right, and no one immediately across. So the next peer to his left is second, then there is no one to the right, no one across left, so the peer across to the right is third.

Example:

A target is at a table with an empty chair directly to his left, then a child to the left of the chair, two children to his right, and a child directly across.

Distance is as follows: No one to the immediate left, so peer to the immediate right is first. Child across is second, child to left of chair is third.

However, in this example, if the children had all been

standing at the table, with no chairs (or sitting on the floor, by the same token), spaces between children are discounted as camera angles can be very misleading. Therefore in this example, if everyone had been standing around the table, with no chairs (and just a space to the left of the target child), the child to his left would be first (i.e. the space would be ignored).

Remember, any child who interacts with the target is first regardless of how distant he/she is. Never code peers who are "just passing by."

SOCIAL ENGAGEMENT

This column reflects the degree to which a target socially engages with another peer. The target child can be coded as engaging in 1 of 25 types of relations (code #'s 18-43), 1 of 4 "miscellaneous" activities (code #'s 14-17), or as in solitary play (99). See Table C-2, and the bottom of the coding sheet (Table C-7) for the list of categories. See Table C-5 for the definitions for each category.

The behavior of longest duration is coded, with some exceptions. The exceptions to this rule are the "special status" behaviors. Some categories are afforded "special status" because they are interactions (e.g. affection) between children which do not occur frequently: possibly 5% of the time. Therefore, they are coded no matter how long they last - even if they occur very briefly. They are:

19,20,23,25,27-33,40-42. 36, 38, and 39, are accorded this "special status" if actual interaction occurs. If two behaviors occur for the same length of time, see Table C-6 (Coding Hierarchy).

NOTE:

Unless a category (e.g. teacher conversation) specifically refers to the teacher, the social engagement is considered to be with another peer. For example, if the target is watching the teacher, this would be coded as 43 (interaction with teacher) and not as 26 (watch).

If a target is not with any peers, and not in a "miscellaneous" activity, s/he is coded in solitary play.

CODING SIMPLIFICATIONS AS TO WHAT COLUMNS TO INCLUDE:

When coding social engagements which include play [i.e. solitary (99), parallel (21), or cooperative (22)], fill in also the type of play.

With the **miscellaneous** categories, not all columns need be or should be filled in. The columns not used with each miscellaneous activity are as follows:

Transition and **Wandering** - Only activity (toy) should be filled in. The other categories do not apply.

Unoccupied - Fill in activity, group composition, distance, and area. The other categories do not apply.

Crying - Fill in activity, group composition, distance, and area. The other categories do not apply.

NUMBER OF INTERACTORS

This column indicates the number of children who are interacting with the target, as defined by the social engagement category just decided upon, up to a maximum of 3, that is, up to the maximum in the "Distance" column. NOTE that for social engagement categories 36, 38 & 39, there are not necessarily interactors. The number of interactors is automatically "0" when targets are alone, that is, engaged in solitary play, or in parallel playing, watching, or unoccupied. It automatically does not apply when children are in transition, wandering, or crying. The number of interactors is considered from the target's point of view. Thus, for example, if a target is engaged in cooperative play with child A, and child B seems to be trying to gain the attention of either the target or child A, but the target remains oblivious to him or her, child B would not be included as an interactor. If the target is interacting with the teacher, he or she may also be interacting with peers, in which case the number of peers would be recorded (obviously, in this case, and in this case only, interaction with peers would not be in the same social engagement category as interaction with teacher). Often, when interaction with the teacher is occurring, targets are not interacting with peers, in which case, the number would be "0."

NOTE:

If the number of interactors is, for example, 2, this would automatically refer to the two closest peers as measured by "Distance."

TYPE OF PLAY (1 - 7)

This column reflects the cognitive nature of the play activity. Use only with solitary, parallel and cooperative play. The play behaviors may be coded as:

1) functional
2) constructive
3) exploratory
4) dramatic - with literal use of the toy
5) dramatic - with nonliteral use of the toy
6) gross motor
7) prescribed use of the toy

Functional play is a repetitive motion which is engaged in simply for the sensation produced (e.g., repetitively hitting a block with hand).

Constructive play is play in which the child creates something, or prepares for an activity (e.g. painting, putting together train tracks, bringing a chair to the art table, putting things into things, waterplay, searching for a toy, puzzles,etc).

Exploratory play occurs when a child examines a toy,

but does not play with it (e.g. looking very closely at a car, turning over a toy to see another side of it). It also includes reading. **NOTE:** There is a specific type of cooperative engagement (22) which is coded with exploratory play: this is when two children are "wandering together," that is, both wandering around the classroom, but doing it together.

Dramatic play with literal use of the toy is pretend play in which the child plays with the toy in the way in which the toy was intended to be used (e.g. the child pretends to drive a train on its track).

Dramatic play with nonliteral use of the toy involves pretend play in which the child uses a toy in a novel or imaginative fashion for which the toy was not designed (e.g. pretending a block is an airplane).

Gross motor play involves activities in which the child is doing some kind of physical motor activity such as running, jumping, going down a slide.

Prescribed use of toy is a catch-all category for play activities which do not fit any of the above types of play. In particular, it is coded if a child is spinning a top or pulling a pull toy (and not doing anything "extra")
NOTE:

If a child plays with two or more toys simultaneously, the type of play for each toy should be coded, if they are different types of play. This is what we call a "blend."

For instance, a child who puts blocks into a purse while pretending he/she is getting money at the bank would be coded as engaging in dramatic play with literal use of the toy, for his/her use of the purse (i.e. using purse for to carry things like money). In addition, dramatic play with nonliteral use would be coded for blocks, as the blocks are being used as if they were coins.

DECISION RULE:

If a child engages in two activities for an equal amount of time, code the play activity which is higher in our degree of sophistication hierarchy (see Table C-6). For example, if a child spends half the interval in functional play, and half in exploratory play, exploratory play would be coded because it is more mature.

AREA

This column contains the code for the area in the school in which the play activity occurred. See Table C-3 for the codes associated with the different areas for each school.

VIGOUR (1 - 5)

This column reflects a subjective impression of the amount of energy exerted by the child while playing, or the amount of noise/vocalizations uttered by the child while

playing, or the amount of motion involved in playing with the toy or the degree of active manipulation of a toy. This measure ranges from 1 to 5.

1 = no movement

-child may be sitting, standing or lying down

-unoccupied or onlooker behaviour

2 = listless movement

-child may change body position (i.e., go from sitting to standing) or may move (i.e., move from chair to floor) or use upper body only or use whole body, but the speed at which these changes occur is slow

3 = average movement

-child may move or change position as in 2, but the speed at which he/she moves is a level at which things take place normally (no extremes--not really slow or really fast; i.e., like walking or arm movements with changes about every 3 seconds)

4 = quick movement

-child's movements are at a quick tempo somewhat between the average movement of 3 and fast movement of 5

5 = fast movement

-child moves very quickly as in running or jumping (whole body) or flailing arms about in an exaggerated manner (upper body only)

-a great deal of distance may be covered

-an extreme amount of activity; exaggerated motion

NOTE:

Vigour depends in part on the context of the activity being coded; for example, running which is a whole body move would be given a vigour of 5; whereas, a child who is at the arts and crafts table would be given a 5 when he/she is painting wildly with a great deal of arm motion. Thus, it is possible to get a 5 in an activity in which one, by the nature of the activity itself, is confined to upper body movements only.

INTENSITY

This index is a measure of the target child's degree of concentration (i.e., mental energy) regarding the task in which he/she is engaging. This measure ranges from 1 to 3.

1 = low intensity

-child is engaging in an activity with little focused attention or demonstrates nervous apprehension

-child's attention wanders often

2 = medium intensity

-child is focused on 1 activity for the majority of the 10 second interval, but she/he may demonstrate some distraction

3 = high intensity

-child engages in 1 activity for the entire 10 second interval

-child exhibits great concentration and may be oblivious to his/her surroundings

Table C-1

Numbered List of Toys

Toys
61. animals
62. arts & crafts & chalkboards
63. art masterpieces & specify
64. baby crib
65. ball
66. blocks - big
68. books
69. cars and small trucks
70. Climbing Apparatus incl. tunnel
71. cushions, blankets, pillows
72. doctor kit
73. dolls
baby
stuffed animals
stuffed scarecrow
my little pony
74. dress-up clothes
hats, purse, wallet, mask, hard-hat

Table C-1 (continued - Page 2)

Numbered List of Toys

Toys

Fisher Price toys:

75. cash register
76. castle
77. farm
78. garage
79. men
80. plane/helicopter
81. record player, spinning top, see-and-say,jack-in-box
82. restaurant & mall
83. airport
84. dollhouse
85. kitchen stuff
    - basket
    - dishes
    - plastic food
    - sink - plastic
    - sewing machine
86. Lego & lego-size blocks

Table C-1 (continued - Page 3)

Numbered List of Toys

Toys
87. mirror
88. sandbox toys: pails, shovels, rakes, and bottles
89. Paint/ Easels
90. plastic shopping basket
91. plastic feltboard
92. playdoh
93. playhouse
94. Puzzles/Board Games
95. stroller
96. telephones
97. tires
98. tools hammer,etc.
01. train
02. train tracks
03. big trucks
04. waterplay toys
05. rocking chair, chair, table
06. pen, pencil

Table C-1 (continued - Page 4)

Numbered List of Toys

Toys
07. stick
08. Fisher Price furniture
09. Makeup accessories, jewellery, & hair-dressing stuff
10. "idiosyncratic" toy from home: e.g. shopping bag, elastic, coin, school-bag
11. pull toy
12. musical instrument
13. personal care/attention e.g. tie shoe, wash hands, blow nose
14. store stuff toy money containers (pretend) food...
15. riding toy
16. real food
00. NO TOY

Table C-2

Numbered List of Social Engagement Categories

Social Engagement
"MISCELLANEOUS" ACTIVITIES
14. Transition
15. Wandering
16. Unoccupied
17. Crying
SOCIAL RELATIONS
18. storytelling with teacher
19. offer/give help
20. initiate
21. parallel play
22. cooperative play
23. physical affection
24. seek help - teacher
25. seek help - peer
26. watch
27. attempt take
28. take
29. object struggle
30. show

Table C-2 (continued - Page 2)

Numbered List of Social Engagement Categories

Social Engagement
31. aggression
32. play hit
33. rough and tumble
34. peer-conversation
35. teacher-conversation
36. imitate
38. approach
39. withdraw
40. offer/give toy
41. have toy taken away
42. receive toy
43. interaction with teacher
99. solitary

Table C-3

Numbered List of Areas

Areas
44. dramatic play
45. sandbox
46. art centre
47. block area
48. tables
49. reading corner
50. climbing area
51. truck area
52. floor
53. carpet - StA
54. kitchen - StA (replaces last year's road map)
55. waterplay
56. lockers
57. window
58. sink
59. cosy corner - StA
60. playhouse - RB
61. store
62. kitchen

Table C-4

Numbered List of Types of Play

Types of Play
1. functional
2. constructive
3. exploratory
4. dramatic play with literal use of toy
5. dramatic play with nonliteral use of toy
6. gross motor
7. prescribed use of toy

Table C-5

Social Engagement Definitions

Miscellaneous Activities

14. **Transition** occurs when a child is moving from one activity to another, or stops playing to get additional material (e.g. child leaves block area, and walks over to paints).
15. **Wandering** occurs when a child aimlessly wanders about the room. This differs from transition in that here there does not seem to be a specific goal; the child does not seem focused on anything.
16. **Unoccupied** is coded whenever a child is doing nothing, e.g. staring off into space, or is "spaced-out."
17. **Crying** is coded whenever the target child is weeping.

Social Relations

18. **storytelling with the teacher** - when the child is listening to the teacher tell a story.
19. **offer/give help** - when the child gives assistance to another child.
20. **initiate** - when the target child begins an activity or a play session with someone else.
21. **parallel play** - the child may be playing beside or near another child, using similar or different toys, but not necessarily with the same goal as the proximal peer.

Table C-5 (continued - Page 2)

Social Engagement Definitions

22. **cooperative play** - differs from parallel play in that the children are interacting with each other, and seem to have a common goal. Rarely, cooperative play may be agonistic.
23. **physical affection** - kissing, hugging, putting an arm around another child.
24. **seek help-teacher** - asking the teacher for assistance.
25. **seek help-peer** - asking a peer for assistance.
26. **watch** - occurs when the child is watching ongoing activities, but is not interacting (e.g. child stands by sandbox, and watches children digging). NOTE: When coding group composition (gc) for watch, one only indicates which child(ren) are being watched if the peer(s) meet the criteria for gc. But if, for example, the target child watches other(s) who are more than five feet away, these peers are not indicated.
27. **attempt take** - child tries to grab something from another child, and is unsuccessful.
28. **take** - child successfully grabs something from another child.
29. **object struggle** - child tries to grab something from a child, and that child resists or defends his/her toy.
30. **show** - child displays something to another child.

Table C-5 (continued - Page 3)

Social Engagement Definitions

31. **aggression** - is coded whenever a child engages with another peer with malicious intent.

32. **play hit** - is coded whenever a child playfully strikes another peer, but not when a child strikes an object.

33. **rough and tumble** - is coded whenever a child engages in playful physical activity which could involve a peer, or a peer and a toy together.

34. **peer conversation** - is coded when conversation occurs with a peer. NOTE: Conversation is coded whenever the child is concentrating on a conversation, and is not focused primarily on a toy or activity. A targeted child is coded as involved in conversation if he/she is talking or actively listening to a child talking to him/her.

35. **teacher conversation** - is coded when it occurs with a teacher. It is not coded when a child merely responds to a teacher's request. In this case, another code, such as 43, would be indicated.

36. **imitate** - when a child displays a low frequency behavior which has just been modelled by another child.[1]

---

[1]Note that there may not be specific interactor(s) with this category, or with category 38 (approach), or category 39 (withdraw)

Table C-5 (continued - Page 4)

Social Engagement Definitions

38. **approach** - when a child goes towards another child or group of children. NOTE: group composition coded is the group approached.
39. **withdraw** - when a child retreats from another child or group of children.
40. **offer/give toy** - when a child extends a toy to another child.
41. **have toy taken away** - when the targeted child's toy is taken by another child.
42. **receive toy** - when a toy is given to the target child.
43. **interaction with teacher** - hugging, helping, offering, showing, complying with, in short general being with or interacting with the teacher which does not fall under numbers 18, 24 or 35.
99. **Solitary Play** - coded when a child is playing apart from other children.

Table C-6

CODING HIERARCHY: SOCIAL ENGAGEMENT

Whenever two social engagement behaviors occur for the same amount of time[2], a decision must be made regarding which behavior is to be coded. In that case, the decision can be made using this hierarchy. Find the positions of the two behaviors, and code the behavior which is higher on the list. We have provided you with an example at the end.

COOPERATIVE PLAY
CONVERSATION
INITIATE
SEEK HELP
OFFER TOY/HELP
SHOW
OBJECT STRUGGLE
(PHYSICAL CONTACT: AFFECTION, RT, AGG, PLAY HIT)
IMITATE
TAKE/ATTEMPT TAKE
APPROACH/WITHDRAW
HAVE TOY TAKEN
PARALLEL PLAY
TEACHER CATEGORIES
SOLITARY PLAY
WATCHING
CRYING
UNOCCUPIED
TRANSITIONAL/WANDERING

EXAMPLE:
For 5 seconds, a child engages in a conversation with another peer and then for 5 seconds, the child watches a group of children.
Conversation is chosen as it is higher on the hierarchy.

[2]if a "special status" behavior occurs even briefly, it would be coded over a noninteractive behavior (but not necessarily over another interactive behavior).

Table C-7

CODING HIERARCHY: TYPE OF PLAY

When one is debating between two types of play, use this hierarchy.

DRAMATIC NONLITERAL USE OF TOY
DRAMATIC LITERAL USE OF TOY
EXPLORATORY
CONSTRUCTIVE
PRESCRIBED USE OF TOY
GROSS MOTOR
FUNCTIONAL

Table C-8

CODING SHEET
Tape ID (Centre (StA or RB), Tape #, Session #_____
Date of Session_____ Counter time of session onset _____
Date of Coding: _____ Coder: _____

Name	Toy	Grp. Comp			Dist	Social Engage	# of ctrs	Type Play	Area	Vigour	Ntns	Inter #
	61-16	M	F	T		14-43	1-3	1-7	44-62	1-5	1-3	

14.	transition	26.	watch	38.	approach
15.	wandering	27.	attempt take	39.	withdraw
16.	unoccupied	28.	take	40.	offer toy
17.	crying	29.	object struggle	41.	have toy taken
18.	storytelling w T	30.	show	42.	receive toy
19.	offer help	31.	aggression	43.	interac with Teach
20.	initiate	32.	play hit	99.	solitary*
21.	parallel*	33.	R & T		
22.	cooperative*	34.	peer convers	*this social engagement	
23.	affection	35.	teacher converse	requires a type of play	
24.	seek help-T	36.	imitate		
25.	seek help-P				

APPENDIX D

RELIABILITY GUIDELINES

Preliminary Calculations

-an observation interval is the line on the coding sheet which corresponds to one 10 second observation of one child.

-make a list of which two observers will be paired with each other.

-agreements (or hits) occur when a) two coders record the same thing, or b) two coders record a non-occurrence of a high-frequency event.

-disagreements (or misses) occur when a) different things are coded or b) one coder marks the occurrence of something and the other coders marks a nonoccurrence.

-other types of agreements and/or disagreements which are specific to certain categories are listed with the appropriate category description.

-percentage agreement (based on the formula # AGREEMENTS / # AGREEMENTS + # DISAGREEMENTS) calculated for pairs of observers.

-calculated for a MINIMUM of 15% of all observations

-reliability is calculated for each category (i.e., down columns not across).

-if a coding interval is "spoiled," (i.e. code number in wrong column, or any other error), disregard the coder's responses for that column/interval (depends on what the error is) and proceed to the next observation interval.

CATEGORIES

Toy

If a child is using one toy, calculation of reliability is straightforward: one simply keeps track of number of agreements, and number of disagreements. If a child uses more than one toy, points are assigned per toy. For example, if there are 2 toys, and the observers agree about both, 2 agreements are marked. If there are 2 toys, and the observers agree about one but not the other, 1 agreement, and 1 disagreement are marked.

Group Composition

Agreements and disagreements can occur on several levels. Coders can agree or disagree on any or all of the following: a) the number of peers, b) the sex of peers, c) the id # of peers. Hence, all of these must be taken into account. After much debate, we have realized that the most efficient and overall accurate way is to treat each level independently.

a) number of peers: Either 1 agree, or 1 disagree is coded. That is, observers can either agree (e.g. both say there are 2; both say there are 5) or disagree (one says there are 2, one says there are 3; one says there are 2, one says there are 7) on the number of peers (independent of sex).

NOTE: 1 agree is also coded when both agree that there are

no peers. 1 disagree is coded when one says there are no peers, and one says there are one or several.

b) sex of peers: Agrees and disagrees are based on the number of children of each sex. For example, if both say there are 2 males and 1 females, 3 agrees are scored. If one says there are 2 males and 1 female, and the other says there are 3 males and no females, 2 agrees and 1 disagree are scored. If one says there are 2 males and 1 female, and the other says there are 2 males and no females, that is also 2 agrees, and 1 disagree.

NOTE: This level is not scored if either one or both observers recorded a nonoccurrence.

c) id #'s of peers: Agrees and disagrees are based on the number of id numbers. For example, if one observer recorded the id numbers 23, 24, 25, and 26, and the other recorded 23, 24, 47, and 26, 3 agrees and 1 disagree would be scored. If one recorded 23, 24, 25, and 26, and the other recorded 23, 24, and 46, then 2 agrees and 2 disagrees would be scored.

NOTE: This level is not scored if either one of the observers recorded a nonoccurrence.

NOTE: If no peers are recorded at the level of group composition, skip distance and social engagement: it is illogical to calculate reliability for these categories.

EXAMPLES: (from R,3,10: sheets 62 to 67).

1) Observer 1: 2 males: #'s 20 and 28, 1 female: # 46.

Observer 2: 2 males: #'s 20 and 42, 1 female: # 46.

score: 1 agree for number of peers (both said 3 peers). 3 agrees for sex (both said 2 males, 1 female). 2 agrees, 1 disagree for id #' (both agreed on 20 and 46, both disagreed on the second male). Total score here: 6 agrees, 1 disagree.

2) Observer 1: 1 male, # 40, no females.

Observer 2: 1 male, # 40, no females.

score: 1 agree for number of peers, 1 agree for sex, 1 agree for id #. Total score: 3 agrees.

3) Observer 1: 1 male, # 43, no females.

Observer 2: no males, 1 female, #38.

score: 1 agree for number of peers, 1 disagree for sex, 1 disagree for id #. Total score: 1 agree, 2 disagrees.

4) Observer 1: 2 males, #'s 29 and 20, 1 female, # 33.

Observer 2: 1 male, # 28, 1 female, # 33.

Score: 1 disagree for number of peers. 2 agrees, 1 disagree for sex. 1 agree, 2 disagrees for id #'s. Total score: 3 agrees, 4 disagrees.

5) Observer 1: no males, no females.

Observer 2: 3 males, #'s 35, 42, and 20, 2 females, #'s 46 and 26.

score: 1 disagree and that's all (see the notes to a), b) and c). Since one observer recorded a nonoccurrence of peers, there is little point in looking at

the sex and id #'s of the children not seen!

Teacher

Reliability is calculated for mutual instances of occurrence, such that an agreement or a disagreement is only noted when there is some mention of the presence of the teacher by either one (disagreement) or both (agreement) of the members of the pair. If neither member of the pair codes the teacher, this interval is ignored and this mutual non-occurrence of the teacher is NOT coded as an agreement. Hence, the formula is # of agreements on occurrence/# agreements on occurrence + # disagreements on occurrence.

Distance

Reliability for this category is not calculated if there were no peers, or only one peer. Thus it is calculated for 2 or 3 peers. Agreements are scored wherever observers agreed on the distance order of peers. Disagreements are scored where there are disagreements of order (but don't count disagreements of number). For example, if both observers agreed that #2 (a boy) was first, #3 (a girl) was second, and #4 (a girl) was third, 3 agreements are scored. If observer A gave the distance order as: #2, #3, #4, and observer B gave it as: #2, #4, #3, then there would be 1 agreement (both said #2 was first), and 2 disagreements (Observer A said #3 was second while

observer B said #4 was second; Observer A said #3 was third, while observer B said #3 was third).

Additional Examples:

-If Observer A gives the order: #2, #3, #5, and Observer B gives the order: #2, #3, #4, code 2 agreements and 1 disagreement.

-If observer A only had 2 people in group composition, while observer B had 3 people, only score reliability for first and second.

Social Engagement

One must examine the pairs' codes such that any disagreements in which one coder records a type of social engagement which would require a type of play and the other coder records a type of social engagement which does not include a type of play, the column--type of play--is ignored for this interval. This procedure is used, because as in the case of activity or toy, by the nature of the rule for the inclusion of columns, the disagreement rate for type of play would be inflated due to a decision disagreement for social engagement. Otherwise, use the formula # agreements/# agreements + # disagreements. Remember that reliability for this category is not calculated if there were no peers.

Miscellaneous Activities

These are treated as social engagement activities, but ones for which reliability of other concurrent categories are not considered (see Coding Manual, Appendix C for specification of categories).

Type of Play

Record only agreements/disagreements on occurrence as was done with **teacher**. Hence, this prevents inflation of agreements (i.e., "both agree that no child was flying around the room" principle). Use # agreements on occurrence/# agreements on occurrence + # disagreements on occurrence to calculate % agreement.

Area

Like toy, reliability calculation is straightforward. Simply assign an agreement or disagreement for each interval. Do not calculate reliability for the few activities for which area is not coded (e.g. transition)

Vigor

The agreements are coded normally, but there is a change in the coding of disagreements. Since this is a ratio measure, a disagreement of 1 vs. 2 is quite different from 1 vs. 3. Therefore, the number assigned to each disagreement reflects the range of difference (i.e., a disagreement of 1 vs. 2 is assigned a 1 (because 2-1 =1), a

disagreement of 1 vs. 3 is assigned a 2 (because 3-1 =2), a disagreement of 1 vs. 4 is assigned a 3 (because 4-1 =3). Percentage agreement is calculated using # agreements/ # agreements + # disagreements.

APPENDIX E

Letters to Parents and Schools

Gender Segregation Study

CONCORDIA
UNIVERSITY

CENTRE FOR RESEARCH IN HUMAN DEVELOPMENT

September, 1986

Dear Mrs. Hamlin;

I am a graduate student in Psychology from Concordia University who would like to observe in your youngest classroom this year, during free play time. I am interested in observing the development of social relationships and play styles in young preschool children. The goals of the project are outlined in the attached description. The project has been funded by the Ministry of Education of Quebec, and has been approved by the Ethics Committee of Concordia University. It is being supervised by Dr. Lisa Serbin, a faculty member of Concordia's Psychology Department and Centre for Research in Human Development.

When observing, I, or sometimes another team member, will make every effort to be as minimally disruptive as possible to the children and the classroom schedule. We would like to be in the classroom one or two afternoons a week, during free time.

It is possible that at some future date this year we would be interested in asking the children some simple questions related to playing with other children. Should we wish to pursue this, I would, with your consent, send the parents a letter describing our procedure and requesting permission to have their children participate.

Please call me at 848 -7561 if you have any questions or comments.

Sincerely,

Judith Gulko, M.A.

1455 de Maisonneuve Blvd. West
Montreal, Quebec
H3G 1M8
514-848-2240

September, 1986

Dear Ms. Thom;

I am a graduate student in Psychology from Concordia University who would like to observe in your youngest classroom this year, during free play time. I am interested in observing the development of social relationships and play styles in young preschool children. The goals of the project are outlined in the attached description. The project has been funded by the Ministry of Education of Quebec, and has been approved by the Ethics Committee of Concordia University. It is being supervised by Dr. Lisa Serbin, a faculty member of Concordia's Psychology Department and Centre for Research in Human Development.

When observing, I, or sometimes another team member, will make every effort to be as minimally disruptive as possible to the children and the classroom schedule. We would like to be in the classroom two mornings a week, during free time.

It is possible that at some future date this year we would be interested in asking the children some simple questions related to playing with other children. Should we wish to pursue this, I would, with your consent, send the parents a letter describing our procedure and requesting permission to have their children participate.

Please call me at 848-7561 if you have any questions or comments.

Sincerely,

Judith Gulko, M.A.

September, 1986

Dear Parent;

I am a graduate student in Psychology from Concordia University who will be visiting in your child's classroom this year, during free play time. I am interested in observing the development of social relationships and play styles in young preschool children. The goals of the project are outlined in the attached description. The project has been funded by the Ministry of Education of Quebec, and has been approved by the Ethics Committee of Concordia University. It is being supervised by Dr. Lisa Serbin, a faculty member of Concordia's Psychology Department and Centre for Research in Human Development.

When observing, I, or sometimes another student, will make every effort to be as minimally disruptive as possible to the children and the classroom schedule. We plan to be in the classroom one or two afternoons a week, during free time.

It is possible that at some future date this year we would be interested in asking the children some simple questions related to playing with other children. Should we wish to pursue this, with the school's consent, I will send you a letter describing our procedure and requesting permission to have your child participate.

Please call me at 848-7561 if you have any questions or comments.

Sincerely,

Judith Gulko, M.A.

Description of the Project

I am interested in learning about the development of young children's play styles and social relationships with peers. I want to observe the range of the two year old's play behaviors, for example, the amount of time spent with dolls, blocks, balls, transportation toys, costumes, running, jumping, time spent alone, together with other children but playing separately, with other children and interacting. I am also interested in the different ways in which children engage in these activities. I wish to observe the "fit" of play style similarities and differences. General questions would be: What sorts of interactions occur between two fairly active and outgoing children when they are, for example, playing with a ball? How does their play differ from play between two children when one is more outgoing and the other is more reserved and reflective? How do children "negotitate" between themselves - how do they deal with conflict, assertiveness and sharing? Do children play different sorts of activities, and in different ways, when they are in groups larger than two? Do the boys and girls tend to group together? Do groups of boys play differently, and in what ways, from groups of girls?

To answer these sorts of questions, we will begin by observing simply the variety of activities the children tend to do, both as individuals and in groups. After these preliminary observations we can begin to examine how play styles fit together, and in what ways children respond to each other.

Nov. 6, 1986

Dear Mrs. Hamlin;

The purpose of this letter is to highlight the reasons why we would like to videotape some free play sessions in addition to continuing our "live" observations of the children. The live observations are extremely informative, and would continue to be an essential part of our project, which would be aided by the addition of videotaping.

We wish to continue our study in a more detailed vein at your centre because of the wonderful quality of its atmosphere- children behave very naturally during free play, and interact with each other cheerfully and freely.

We have begun to get a sense of the frequency with which children play alone, in parallel, and cooperatively with others, and how different types of toys/activities relate to these patterns of social engagement. We've also begun to see some of the more global patterns of young children's interactions. While this information is quite informative, it has also crystallized certain questions we can really only pursue by videotaping. For example, what subtle signals initiate, maintain and terminate interactions (i.e. eye contact, body language, and facial expressions)? It is only through videotaping that we can tap these fleeting cues and capture in greater depth the <u>quality</u> of interaction. Hence, we would like to videotape portions of free play sessions.

This procedure will allow us to collect information in a manner which is not intrusive for the children. The new Superbeta cameras are compact, hand-held, and fairly small. No special lighting is required. If you wish, we are more than willing to demonstrate the use of the camera to the teachers and students.

PARENT CONSENT FORM

_ I will allow my child to participate

_ I will not allow my child to participate

_____ _____

Signature Child's Name

_____

Date

___ I would like a copy of a report on the study results

Please print your name and mailing address below:

_____

Name

_____

Street

_____

City

_____

Postal Code

June 11, 1987

To everyone at St. Andrew's School:

As the school year comes to a close, we would like to take this chance to thank you for allowing us to be at St. Andrew's. We have thoroughly enjoyed having the opportunity to observe your delightful children at play. Cooperative staff and excellent facilities made our "work" a pleasure. From our experience in your school, we have formulated our hypotheses more clearly, and with further observations, we will have enough information to test our ideas.

At this point, we have two main hypotheses about how young children affiliate with others when they begin preschool. The first concerns how children's play styles may influence with whom they associate with. For example, it may be that children who are interested in certain types of toys or activities, such as those promoting active, gross motor play, tend to play together. The second hypothesis concerns the influence of group composition on social behavior. It is possible that children's interactions (such as sharing, talking, struggling over a toy) are influenced by the group they are with, that is, by the number of children, and the sex of the children with whom they are playing.

We have been very enthusiastic about our experience at the school, and look forward to continuing in the Fall. We feel fortunate to be able to gather information in a warm and relaxed atmosphere, as is found at St. Andrews.

We wish you a happy and relaxing summer.

Sincerely,

Lora Moller, M.A. Judi Gulko, M.A.

June 11, 1987

To everyone at Rainbow Preschool:

As the school year comes to a close, we would like to take this chance to thank you for allowing us to be at Rainbow. We have thoroughly enjoyed having the opportunity to observe your delightful children at play. Cooperative staff and excellent facilities made our "work" a pleasure. From our experience in your school, we have formulated our hypotheses more clearly, and with further observations, we will have enough information to test our ideas.

At this point, we have two main hypotheses about how young children affiliate with others when they begin preschool. The first concerns how children's play styles may influence with whom they associate. For example, it may be that children who are interested in certain types of toys or activities, such as those promoting active, gross motor play, tend to play together. The second hypothesis concerns the influence of group composition on social behavior. It is possible that children's interactions (such as sharing, talking, struggling over a toy) are influenced by the group they are with, that is, by the number of children, and the sex of the children with whom they are playing.

We have been very enthusiastic about our experience at Rainbow, and would like to continue to observe the children next year. We believe it is very important to gather information that is representative of children's play, in an atmosphere that is warm and relaxing, as is found at Rainbow.

We wish you a happy, relaxing, summer, and we look forward to seeing you in the Fall.

Sincerely,

Lora Moller, M.A. Judi Gulko, M.A.

CONCORDIA UNIVERSITY

September, 1987

CENTRE FOR RESEARCH IN HUMAN DEVELOPMENT

Dear Mrs. Hamlin:

We are graduate students in Psychology from Concordia University who would like to videotape in your youngest classroom this year, during free play time, as we did last year. Last year, we conducted observations in order to discover the aspects of children's play relevant to the questions about social interaction and play styles posed in the attached description. This year, we wish to collect observations to answer some of those questions. The project has been funded by the Ministry of Education of Quebec, and has been approved by the ethics committee of Concordia University. It is being supervised by Dr. Lisa Serbin, professor in Concordia's Psychology Department, and director of the Centre for Research in Human Development.

When observing, we will make every effort to be as minimally disruptive as possible to the children and to the classroom schedule. We would like to be in the classroom two afternoons a week, during free play. We will coordinate our schedules to accommodate the teacher's plans and the school's calendar.

It is possible that at some future date this year we would be interested in asking the children some simple questions related to playing with other children. Should we wish to pursue this, we would, with your consent, send the parents a letter describing our procedure and requesting permission to have their children participate.

Please call either of us at 848-7561 if you have any questions or comments.

Sincerely,

Judith Gulko, M.A.

J. Gulko

Lora Moller, M.A.

Lora H Moller

1455 de Maisonneuve Blvd. West
Montreal, Quebec
H3G 1M8
514-848-2240

Description of the Project

We are interested in investigating the development of young children's play styles and their social relationships with peers. Although researchers have studied the formation of friendship and social development in older children, little is known about peer relationships in children younger than four years of age. Past studies have found that social relations influence children's general social, emotional, and cognitive adjustment. Thus, the early development of these interpersonal capacities necessitates further exploration.

We hypothesize that there may be mutual influences between the activities children choose, and their social interactions. For example, drawing may present more opportunities for parallel play, and conversation, whereas play in the kitchen area may be more conducive to mutual fantasy play. We further hypothesize that positive and negative experiences while interacting with peers and toys in a group situation will contribute to the development of characteristic styles of playing. We also think that personal styles on dimensions such as activity level, which children bring to the classroom situation, contribute to this development.

Last year (1986-87) we observed in your child's school to help us clarify our hypotheses and to establish a method for addressing these questions. From those observations, we derived a system in which we observe, at set intervals, the toys (e.g. blocks, trucks, dolls, kitchen toys) children are using, the number and sex of children in a group, how they are socially engaged (e.g. parallel play, showing, imitating), in what area of the classroom (e.g. sandbox, art tables), and how actively they are playing. From the observations we gather this year, we can proceed to investigate the hypotheses outlined above.

CONCORDIA UNIVERSITY

CENTRE FOR RESEARCH IN HUMAN DEVELOPMENT

September, 1988

Dear Parent,

We are writing to thank you for allowing your child to participate in our study of young children's play and friendship patterns, carried out last year at Rainbow with support from the Quebec Ministry of Education (FCAR program). In response to our letter requesting permission for your child's participation, you indicated that you wish to receive a report on the results of our project. Over the summer, we completed a preliminary analysis of our findings, and we would like to share these results with you.

Although researchers have studied the formation of friendship and social relationships extensively in older children, little is known about peer relationships in children under three. Studies of older children have found that social relations play an important role in children's social, emotional, and cognitive development. For this reason, we wanted to explore the early formation of play patterns and social relationships during the child's first years of preschool experience.

In our project, we wanted to examine the way in which these young children (aged 2½ to 3 years) develop relationships with their classmates. We were particularly interested in how individual play styles and activity preferences might bring children together. We were also interested in how characteristics such as gender influence the formation of children's early friendships.

Based on observations over the course of the school year of the children during free play periods with their own and other classes, we have some preliminary insights into the ways in which the youngest group of children at Rainbow began to form friendships. First, we found that these young children were extremely sensitive to the "play styles" of their peers. The children tended to play with other children who showed similar styles to themselves. For example, children who had a highly active style tended to play together, and children also chose peers whose verbal and social skills had reached a similar level of maturity. While it does seem quite natural that children would choose "compatible" play partners, we were impressed that children so young were quite sensitive to these dimensions.

Concerning gender, we did not find that these young children showed much preference for playing with other children of the same sex. Mixed-sex groups were far more common that same-sex groups in these classes. However, we did find that gender made a difference in the nature of the children's play. When

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(continued on page 2)