Group- and Individual-Level Information Affects Children's Playmate Choice

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Abstract

Social relationships such as playmates and friendships are important for children's development. But relatively little is known about how such relationships are formed. In two studies, 5- to 6-year-old children chose their playmates in a hypothetical scenario that resembled a real-world social situation. The findings suggested that children used both the base-rate information about the social group and the adaptive sampling strategy in playmate choice – they approached or avoided individuals based on the group that the individuals belonged to, as well as their past experiences with the individuals.

Keywords: playmate; friendship; adaptive sampling; statistical learning

Introduction

One of the most important aspects of being humans is that we form relationships with other non-kin individuals. Starting from infancy, we interact and affiliate with the individuals who take care of us. As we enter preschools and kindergartens, we play with our peers and become playmates with them. Over time, some of those relationships might develop into more enduring and richer relationships, namely friendships. Friendship plays an important role in children's lives. Having high-quality and stable friendships increases children's peer-rated sociability and leadership (Berndt, Hawkins, & Jiao, 1999), as well as their liking for schools (Ladd, Kochenderfer, & Coleman, 1996). However, less is known about the process of how children become playmates, or how playmates develop into friends. In this paper, we focus on the first step of this process – how do children choose their playmates?

Social Groups Guide Children's Preferences

From early in development, social group memberships influence infants' and children's preferences for individuals. They show implicit and explicit preferences for individuals based on gender, race, and linguistic groups.

Three- to 4-month-olds prefer to look at faces of the same gender as their primary caregivers (Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002). They also prefer to look at faces of the same race as themselves, but only if infants live in a monoracial environment (Bar-Haim, Ziv, Lamy, & Hodes,

2006). Five- to 6- month-olds prefer to look at an adult who previously spoke to them in their native language over an adult who previously spoke an unnatural language (natural speech played in reverse), a foreign language, or their native language with a foreign accent (Kinzler, Dupoux, & Spelke, 2007). Children who are 5 years old or older prefer other children of the same gender (Yee & Brown, 1994); 5- to 6-year-old white, American children reported that they prefer White individuals over Black individuals, and showed an implicit pro-white attitude as measured by the Implicit Association Test (Baron & Banaji, 2006).

Children choose their friends based on these social categories as well. Shutts, Pemberton Roben, and Spelke (2013) asked 3-year-olds to choose a friend from a pair of children, one belonged to the same social group (i.e., gender or race) as themselves, and the other belonged to a different social group. Three-year-olds chose the child of the same gender as themselves to be their friends, but they did not choose friends based on race. In Kinzler et al. (2007), 5-year-olds chose a child who previously spoke their native language as their friends, rather than a child who previously spoke a foreign language or their native language with a foreign accent.

Why would children show preferences for individuals based on the social groups that they belong to? One possibility is that children have formed beliefs about the base-rate proportion of individuals with desired characteristics in different social groups (e.g., the proportion of nice individuals or the proportion of individuals who share similar interests with themselves). For example, if children believe that a certain social group consists of a high proportion of nice individuals, then they would be more likely to infer that an individual from that social group is nice, even if they do not know anything else about that individual. Thus, base-rate information about the group might influence children's preferences for whom they choose as playmates.

Adaptive Sampling

Another factor that might influence children's playmate choice is the quality of the initial experience with an individual. If the initial experience was pleasant, children would probably consider interacting with that individual more. However, if the initial experience was unpleasant, they

would be more likely to avoid that individual in the future. In the social psychology literature, this phenomenon is known as adaptive sampling. Adaptive sampling is the tendency for people to continue sample activities that they had positive experiences with and to avoid activities that they had negative experiences with (Denrell & Le Mens, 2012). Thus, in social interactions, people would prefer to continue interacting with individuals who have been friendly to them, and avoid individuals who have been mean to them.

Experimental evidence has shown that adults use this adaptive sampling strategy. Fazio, Eiser, and Shook (2004) designed a game that was analogous to how people form attitudes about other individuals in social interactions. In the game, participants were shown beans and had to decide whether to approach or avoid them. They could survive by approaching beans with positive energy level and avoiding beans with negative energy level. Critically, they only learned about the energy level of the beans that they approached. Participants' strategies in the game were consistent with the adaptive sampling strategy – they approached beans that they believed to be positive, and avoided beans that they believed to be negative.

Would children also use the adaptive sampling strategy in their social interactions? As Denrell and Le Mens (2012) mentioned, the strategy of adaptive sampling is only adaptive to the extent that past experiences can predict the qualities of future experiences. Do young children believe that an individual's past behaviors are predictive of that individual's future behaviors? In Boseovski and Lee (2006), 3- to 6-year-olds were shown agents who performed multiple behaviors toward one or more recipients, and they were asked to make trait attributions and behavioral predictions. When the agent performed 5 trait-consistent behaviors (e.g., nice or mean behaviors) and one neutral behavior toward the same recipient, 3- to 6-year-olds were able to make the correct trait attribution, but only 5- to 6-year-olds were able to make the correct behavioral predictions. The results suggest that if an individual has shown multiple instances of trait-relevant behaviors toward a single recipient, children as young as 5 and 6 years of age believe that those past behaviors are predictive of the individual's future behaviors. Assuming children prefer to interact with individuals who are nice to them, these results hint at the possibility that children may employ the adaptive sampling strategy in choosing playmates.

Interaction Between Group- and Individual-Level Information

When choosing playmates, children might consider the group-level information (i.e., base-rate information about the social group that an individual belongs to), as well as the individual-level information (i.e., the past experiences with an individual). But how would the group-level and individual-level information interact in children's reasoning about playmate choice? How is the tendency to approach or avoid individuals based on past interactions with them affected by the social groups that the individuals belong to?

In real-world social interactions, we might prefer interacting with individuals whom we had positive experiences with; but at the same time, we are also motivated to approach new individuals whom we have not interacted with. If we believe that the social group that those individuals belong to consists of mostly nice individuals, the desire to approach new individuals and the desire to continue interacting with individuals whom we had positive experiences with might be equally strong. But if we believe that the social group consists of mostly mean individuals, we might be less interested in approaching new individuals, especially if we have already met a few nice individuals in that group. As for individuals whom we had negative experiences with, the desire to avoid those individuals might be strong regardless of our beliefs about the social group.

Would children be able to consider both levels of information in their reasoning? Infants and young children are sensitive to statistical information in various domains (Denison & Xu, 2019). For instance, infants expect that the proportion of different objects in a randomly drawn sample would match the base-rate proportion in the population (Xu & Garcia, 2008). When the proportion in the sample does not match the proportion in the population (i.e., when an agent removed five toys of one type from a box containing a minority of that type of toys), infants and preschoolers inferred that the agent had a preference for the minority type of toys (Kushnir, Xu, & Wellman, 2010). Thus, infants and children can flexibly use base-rate information in their reasoning. Children also use information about an individual's past behaviors in their reasoning, as shown in Boseovski and Lee (2006). In another study, Gualtieri & Denison (2018) examined children's ability to integrate base-rate and individuating information. They asked children to predict whether a particular robot was nice or mean based on the base-rate information (e.g., a majority of the robots in the park are nice), and the individuating information (e.g., the particular robot showed two mean behaviors). While older children and adults neglected the base-rate information, 4-year-olds were able to integrate the two pieces of information in their prediction.

However, none of the studies mentioned above has investigated how children's own past experiences with an individual affect their decision to interact with that individual in the future, and in particular, whether that decision is guided by both the adaptive sampling logic and the base-rate information about the group.

The Present Studies

In the present studies, we examined whether children's playmate choices are influenced by an interaction between the base-rate information about the group and the past experiences with an individual. We first gave children information about a novel social group – a new classroom that they had just transferred to. We told children either that a majority of the children in the new classroom were nice (Experiment 1) or that a majority of the children were mean (Experiment 2). We also gave children information about their past

experiences with a specific individual – the target child, that she or he showed nice or mean behaviors toward the participants. Then, we asked them to choose a playmate from two options: either the target child or a new child randomly selected from the classroom.

We hypothesize that children's playmate choices will be influenced by the interaction between group-level and individual-level information. Specifically, in both experiments, children will be more likely to choose a new child randomly selected from the classroom over the target child who is mean to the participant. They will be more likely to choose the target child who is nice to them over a new child in Experiment 2 (Majority Mean Classroom). However, they will be equally likely to choose the nice target child and a new child in Experiment 1 (Majority Nice Classroom).

Experiment 1: Majority Nice Classroom

Methods

Participants Twenty-four children between the ages of 5 and 6 years (11 females; mean age = 5.88; range = 5.08 to 6.75; $SD = 0.61$) participated in the experiment. Participants were tested in a lab room at UC Berkeley, in a quiet room at elementary schools, or at a children's museum. Parents of the participants provided written informed consent prior to the experiment session.

Stimuli and Procedure Children were seated in front of a laptop. The experimenter told children to imagine that they had just transferred to a new school, and that they would play with some children in their new classroom and make some new friends. Then, children played 2 trials of the game: one trial in which the target child was nice (the target nice trial), and the other in which the target child was mean (the target mean trial). The order of the trials was counterbalanced across participants. Each trial consisted of 4 phases described below.

Figure 1: An example picture of all children in the classroom.

Classroom information. On the laptop, a picture of all children in the classroom were shown on the screen (Figure 1; gender of the children in the classroom was counterbalanced across trials). Then, 16 of the 20 children were highlighted in yellow and labeled "nice children". The experimenter told participants that a majority of the children in this classroom

were nice, while pointing to the highlighted children on the screen. The 4 remaining children were then highlighted in blue and labeled "mean children". The experimenter told participants that a few of the children in this classroom were mean, while pointing to the highlighted children.

Behaviors of a sample of children. Then, children "played" with a sample of 5 children from the classroom. On the laptop screen, the experimenter showed each of the 5 children's behaviors toward the participant. Four of the children exhibited 5 nice behaviors and 1 mean behavior, and the other child exhibited 5 mean behaviors and 1 nice behavior. The mean child was shown in the third position. The order of the behaviors (i.e., whether the inconsistent behavior was shown first or shown last) was counterbalanced across participants. The behaviors were either sharing behaviors (sharing stickers or toys) or helping behaviors (giving the participant a missing piece of a puzzle or giving the participant a box of crayon for coloring papers). Example stimuli are shown in Figure 2. The type of behaviors was counterbalanced across trials.
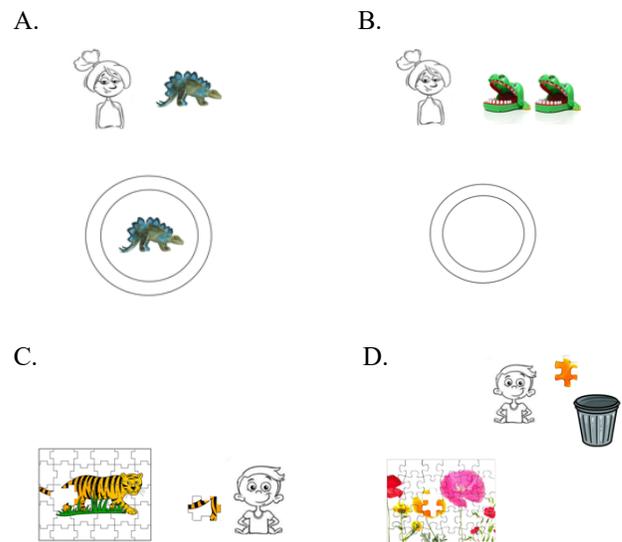

Figure 2: Example stimuli of a sharing trial/nice behavior (A), a sharing trial/mean behavior (B), a helping trial/nice behavior (C), and a helping trial/mean behavior (D).

Behaviors of the target child. Then, another child from the classroom, the target child, appeared on the screen. The experimenter told children that they would play with this child and decide whether they would like this child to be their playmate for today. In the target nice trial, the target child exhibited 5 nice behaviors and 1 mean behavior; in the target mean trial, the target child exhibited 5 mean behaviors and 1 nice behavior.

Playmate choice and prediction. Then, children were asked to choose a playmate from two options: either the target child or a new child randomly selected from the classroom (referred to as the "new child" from now on). On the screen, the target child appeared on the left side of the screen, and

the whole group of children from the classroom appeared on the right side of screen. If the participant did not understand what is randomly selected, the experimenter told children that, "You will get one of the children from the classroom, but you do not know whom exactly it will be." After children chose their playmate, the experimenter asked children to predict whether the chosen playmate would be nice or mean to them.

Results

Playmate Choice As shown in Figure 3, in the target nice trials, 10 out of 24 children chose the new child as playmate, which is not significantly different from chance (Exact binomial test: $P = 0.42$, 95% CI [0.22, 0.63], $p = 0.54$, Cohen's g = -0.08). In the target mean trials, 20 out of 24 children chose the new child, which is significantly above chance (Exact binomial test: $P = 0.83$, 95% CI [0.63, 0.96], $p = 0.002$, Cohen's $g = 0.33$).

Since trial type (target nice trial or target mean trial) is a within-subject variable, we used mixed effects models that controlled for the random effects of individual participants to fit the data. Specifically, we used generalized linear mixed models (GLMMs) to predict participants' binary choice of partner (new child = 1, target child = 0) from trial type, behavior order, age, and gender, while controlling for the random effects of individual participants. The best-fitting model included trial type as the only predictor. Based on this model, the odds of choosing the new child decreased when children were in the target nice trial, compared to when they were in the target mean trial (β = - 2.26, SE = 0.97, z = -2.32, p = 0.02). This model outperformed the null model ($\text{AIC}_{\text{trial}}$ = 59.85, AIC_{null} = 67.51, χ^2 = 9.66, p = 0.002). More complex models that included behavior order, age, or gender did not perform better than the best-fitting model.
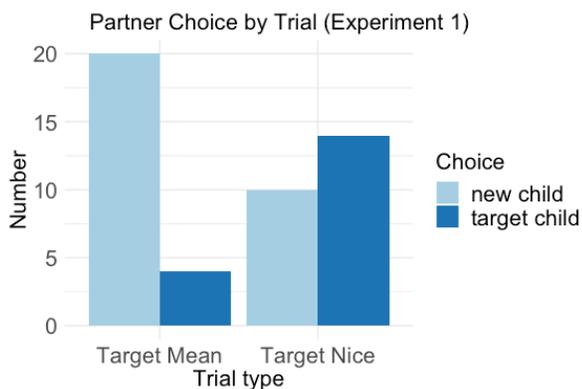

Figure 3: The number of participants who chose the target child or the new child as a playmate in target nice trial and target mean trial, in Experiment 1.

Prediction Children's predictions about the chosen playmate are shown in Table 1. Children predicted that the chosen playmate was nice if they chose the target child in the

target nice trials, or if they chose the new child in the target mean trials ($p < 0.01$ in Exact binomial tests). They were equally likely to predict that the chosen playmate was nice or mean if they chose the new child in the target nice trials, or if they chose the target child in the target mean trials (p = 0.11 and 1 in Exact binomial tests).

We used generalized linear mixed models (GLMMs) to predict participants' binary prediction response (nice = 1, mean = 0) from trial type, partner choice, behavior order, age, and gender, while controlling for the random effects of individual participants. The best-fitting model predicted children's playmate prediction from the interaction between trial type and partner choice. Based on this model, the odds that the child predicted the playmate to be nice increased if they chose the new child as playmate (β = 36.83, SE = 11.15, z = 3.30, $p < 0.001$); however, the odds decreased if the child chose the new child in the target nice trial, although this effect is not statistically significant (β = - 45.51, SE = 31.59, z = -1.44, p = 0.15). This model outperformed the null model ($\text{AIC}_{\text{trial*partner}}$ = 25.96, AIC_{null} = 37.72, χ^2 = 17.76, p <0.001), the model that only included trial type ($\text{AIC}_{\text{trial}}$ = 39.72, χ^2 = 17.76, p <0.001), the model that only included partner choice ($\text{AIC}_{\text{partner}}$ = 38.71, χ^2 = 16.74, p <0.001), as well as the model that included both trial type and partner choice without the interaction ($\text{AIC}_{\text{trial+partner}}$ = 40.66, χ^2 = 36.80, p <0.001). More complex models that included age, gender, or behavior order did not perform better than the best-fitting model.

Table 1: Playmate prediction in Experiment 1.

Trial type	Playmate choice: new child	Playmate choice: target child
Target Nice	8 predicted nice; 2 predicted mean	13 predicted nice; 1 predicted mean
Target Mean	19 predicted nice; 1 predicted mean	2 predicted nice; 2 predicted mean

Discussion

When children were told that the majority of the children in the new classroom were nice and encountered a nice child from that classroom, children were equally likely to choose that child as a future partner as they were to choose a new child randomly selected from that classroom. In turn, when they encountered a mean child from that classroom, they were more likely to choose a new random child as playmate than the previously encountered mean child. Comparison of the two scenarios revealed that children were less likely to choose the new child in target nice trials than in target mean trials. In other words, children were more likely to select the nice target child as a playmate than they were to select the mean target child. Thus, children's playmate choices were in accordance with an adaptive sampling strategy.

Information about the social group affected children's decision as well. They were told that the majority of the children in the classroom were nice, and thus a new child randomly selected from the classroom was likely to be nice.

When choosing between the nice child and the new child, some of the participants decided to approach the nice child, while others decided to approach the new child. Children might have thought that the two options were equally good, and therefore chose randomly. Alternatively, there might be individual differences in children's strategies of choosing playmates, such that some children prefer "safer" options, and choose individuals whom they have had positive experiences with, while other children prefer "riskier" options, and choose unknown, novel individuals. Future studies should be designed to test the two alternatives.

Furthermore, children were more likely to predict their playmates to be nice if they had chosen the new child, but only when they chose between a mean child and a new child. This is reasonable given that the new child, who was randomly selected from a majority nice classroom, is more likely to be nice than the child who had shown mean behaviors toward the participant.

Experiment 2: Majority Mean Classroom

Methods

Participants Twenty-four children between the ages of 5 and 6 years (12 females; mean age = 5.90; range = 5.00 to 6.92; SD = 0.54) participated in the experiment. Participants were recruited and tested in the same manners as in Experiment 1.

Stimuli and Procedure The procedure of Experiment 2 was the same as that of Experiment 1, except that in the classroom information phase, the experimenter told children that a majority of the children in the classroom were mean (while 16 children were highlighted on the screen), and that a few of the children were nice (while the 4 remaining children were highlighted on the screen). Accordingly, the sample of children consisted of 4 mean children and a nice child, with the nice child shown in the third position.

Results

Playmate Choice As shown in Figure 4, in the target nice trials, 3 out of 24 children chose the new child, which is significantly below chance (Exact binomial test: $P = 0.13$, 95% CI [0.03, 0.32], $p < 0.001$, Cohen's $g = -0.37$). In the target mean trials, 19 out of 24 children chose the new child, which is significantly above chance (Exact binomial test: $P = 0.79$, 95% CI [0.58, 0.93], $p = 0.01$, Cohen's $g = 0.29$).

Generalized linear mixed models (GLMMs) were used to predict participants' binary choice of partner (new child = 1, target child = 0) from trial type, behavior order, age, and gender, while controlling for the random effects of individual participants. The best-fitting model included trial type as the only predictor. Based on this model, the odds of choosing the new child decreased when children were in the target nice trial, compared to when they were in the target mean trial ($\beta = -23.33$, $SE = 3.32$, $z = -7.02$, $p < 0.001$). This model outperformed the null model (AIC$_{trial}$ = 30.55, AIC$_{null}$ = 70.21, $\chi^2 = 41.66$, $p < 0.001$). More complex models that

included behavior order, age, or gender did not perform better than the best-fitting model.
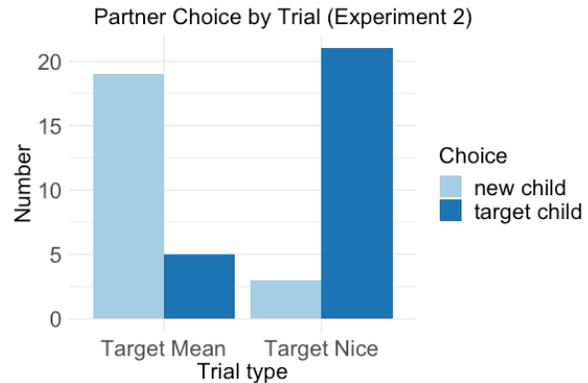

Figure 4: The number of participants who chose the target child or the new child as playmate in target nice trial and target mean trial, in Experiment 2.

Prediction Children's predictions about their playmates are shown in Table 2. Children predicted that the chosen playmate was nice if they chose the target child in the target nice trials, or if they chose the new child in the target mean trials ($p < 0.01$ and $p = 0.02$ in Exact binomial tests). Their predictions did not differ from chance if they chose the new child in the target nice trials, or if they chose the target child in the target mean trials ($p = 1$ in Exact binomial tests). Then, we used generalized linear mixed models (GLMMs) to predict participants' binary prediction response (nice = 1, mean = 0) from trial type, partner choice, behavior order, age, and gender, while controlling for the random effects of individual participants. None of the models that included any variables as predictors performed better than the null model.

Table 2: Playmate prediction in Experiment 2.

Trial type	Playmate choice: new child	Playmate choice: target child
Target Nice	2 predicted nice; 1 predicted mean	19 predicted nice; 2 predicted mean
Target Mean	15 predicted nice; 4 predicted mean	2 predicted nice; 3 predicted mean

Discussion

Again, children used the adaptive sampling strategy. Majority of the participants in this experiment approached the child who was nice to them and avoided the child who was mean to them. Information about the social group, that the majority of the children in this classroom were mean, also influenced their decisions. Since a new child randomly selected from this classroom is likely to be mean, children should be less likely to choose the new child, especially when choosing between a nice child and a new child. Indeed, in the target nice trials, participants in Experiment 2

were less likely to choose the new child ($P_2 = 0.13$) than participants in Experiment 1 ($P_1 = 0.42$), although the difference is only marginally significant (Fisher's exact test: $p = 0.076$, Cramér's phi = 0.20).

Children's prediction about the chosen playmate did not differ by the trial type or the playmate they chose. However, note that in the target mean trials, most of the children who chose the new child as a playmate predicted that the new child would be nice. That is unlikely to be the case since majority of the children in the classroom were mean. We will discuss the possible rationale for this in the General Discussion.

General Discussion

The purpose of the present studies was to understand how children choose their playmates. Specifically, we examined whether children's playmate choice was influenced by an interaction between the group-level information (the proportion of nice and mean children in the classroom) and the individual-level information (the target child's behaviors toward participants). The results of our two experiments showed that playmate choices were influenced by both.

When choosing between a mean child and a new child, children always preferred the new child, regardless of the classroom composition. This preference is reasonable in the majority nice classroom, since there is an 80% chance that the new child would be nice. But in the majority mean classroom, the chance that the new child would be nice is only 20%. Most of the children still chose that child as a playmate, and predicted that she would be nice. Those children might have ignored the base-rate information. Alternatively, they might be more willing to take a risk and believed that it would generate a favorable result. That is, they were almost 100% certain that the child whom they were playing with was mean, but if they chose the new child, there was a 20% chance that she would be nice.

In contrast, when choosing between a nice child and a new child, children's decisions differed based on the classroom composition. If they heard that the majority of the children were nice, about half of the children chose the new child as playmate, but if they heard that the majority of the children were mean, almost none of the children chose the new child. Thus, in the case that children can stick with a nice individual in a group of mostly mean individuals, they are less likely to approach new individuals. This might be related to the role of negative stereotypes in real-world social interactions. An inaccurate negative stereotype about a social group would be hard to overcome, since people are less likely to interact with new individuals from that group. Thus, they would not have additional data to overcome the negative stereotype. One way to test this idea would be to offer children a choice between a new child from a majority mean classroom and a new child from another classroom (without base-rate information). Would children avoid the new child from the majority mean classroom and choose the new child from another classroom instead?

The present results make two unique contributions to the existing literature. First, like adults, children also use the adaptive sampling strategy when they are interacting with individuals and choosing playmates. In both experiments, children were more likely to approach the target child who had been nice to them, and avoid the target child who had been mean to them. Furthermore, their adaptive sampling strategy is influenced by the base-rate information about the group (i.e., the probability that the alternative option, the new child, is nice or mean).

Second, the present studies documented the process of children's playmate choice in a situation that resembled the real social world. In real life, children might also form prior beliefs (i.e., base-rate information) about their new schools by hearing information from their parents or other children, and they will interact with a few individuals before they start to make choices about playmates. For children, becoming playmates often set the stage for the formation of a more enduring and richer relationship – friendship. Young children already have a grasp of the concept of friendship. Preschoolers preferentially help their friends (Engelmann, Haux, & Herrmann, 2019) and preferentially share with their friends (Moore, 2009; Paulus & Moore, 2014). Children also use cues such as partial sharing, secret sharing, similarity, propinquity and loyalty to make inferences about other people's friendships (Liberman & Shaw, 2017; 2018; 2019). In future research, it would be important to understand how the playmate choosing processes examined here are related to the more intricate friendship forming processes.

In conclusion, our studies documented the first step in children's friendship formation – playmate choice. The findings showed that children use the adaptive sampling strategy when they choose their playmates, and they also consider the base-rate information about the social groups that their potential playmates belong to in their decisions.

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