

**I won't tell: Young children show loyalty to their group by keeping group secrets**

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## Abstract

Group loyalty is highly valued. However, little is known about young children's loyal behavior. This study tested whether 4- and 5-year-olds ( $N=96$ ) remain loyal to their group even when betraying it would be materially advantageous. Children and four puppets were allocated to novel groups. Two of these puppets (either in-group or out-group members) then told children a group secret and urged them not to disclose the secret. Another puppet (not assigned to either group) then bribed children with stickers to tell the secret. Across ages, children were significantly less likely to reveal the secret in the in-group than the out-group condition. Thus, even young children are willing to pay a cost to be loyal to their group.

*Keywords:* Loyalty, Group Membership, Group Norms, Secrecy

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Across human cultures, loyalty is highly valued (Haidt & Joseph, 2004). We expect our group members to stick with the group and to be trustworthy in their dealings with fellow in-group members (Brewer & Brown, 1998). Individuals who abandon or betray their group are often punished harshly. In times of war, deserters can be executed and, even in times of peace, defectors are judged very negatively by their group members (e.g., Singer & Radloff, 1963). One particularly reprehensible offense is betraying the secrets of one's group to an outgroup. Traitors and spies are held in contempt by group members and often punished harshly as well.

Why is loyalty so important to us? Living in groups has been critical to humans' success. Only by cooperating with others have we been able to survive and flourish (Boyd & Richerson, 2009; Roberts, 2005). For cooperation to be stable and successful, group members must be able to trust and rely on each other over time (Tomasello, Melis, Tennie, Wyman, & Herrmann, 2012). Loyalty is particularly valued in situations in which defection or betrayal would harm the group, but would be advantageous for the individual (e.g., Levine & Moreland, 2002; Zdaniuk & Levine, 2001). Consequently, group members are often expected to sacrifice personal benefits for the good of the group as a whole (Brewer & Silver, 2000). It is this personal sacrifice that puts an individual's loyalty to the test and makes it visible in its strongest form.

Kindergarten age is known to be an important period for the development of group-related attitudes and behavior. For example, a number of studies have found that children around this age have reliable preferences for their in-group over out-group members (e.g., Aboud, 2003; Bigler & Liben, 1993; Dunham, Baron, & Carey, 2011; Dunham & Emory, 2014; Kinzler & Spelke, 2011). From around the age of 4,

group membership has also been found to influence children's learning (Kinzler, Corriveau, & Harris, 2011) and motivation (Master & Walton, 2012), and to guide their expectations and judgments about other people's behavior (Chalik & Rhodes, 2014; Rhodes & Chalik, 2013). Further research suggests that school-aged children are willing to give up resources for their group members. For example, Fehr, Bernhard, and Rockenbach (2008) found that 7- to 8-year-old children are more likely to share a resource with an in-group member than an out-group member, while other research indicates that by 6 years of age, children are more willing to engage in costly punishment on behalf of in-group members than out-group members (Jordan, McAuliffe, & Warneken, 2014). Yet, to our knowledge, there have been no studies demonstrating that young children show loyalty to their group by making personal sacrifices for the sake of the group.

The majority of research on this topic has investigated how children evaluate the loyal or disloyal behavior of others rather than on their own sense of loyalty to the group. In these studies, loyalty is typically defined as preferentially interacting with, or saying positive things about, in-group members. For example, Castelli, De Amicis, and Sherman (2007) found that White children between 4 and 7 years of age favor other White children who positively interact with a racial in-group member (i.e., a White child) over White children who interact with a racial out-group member (i.e., a Black child). Another set of studies investigated children's judgments of in-group and out-group peers who expressed normative versus deviant statements (e.g., saying positive things about their in-group only versus also saying positive things about their out-group, respectively). Five- to 12-year-old children generally preferred normative to deviant in-group members (e.g., Abrams, Rutland, & Cameron, 2003; Abrams, Rutland, Cameron, & Ferrell, 2007; Abrams, Rutland, Pelletier, & Ferrell, 2009).

The only study that has investigated whether children positively evaluate individuals who pay a cost in order to remain loyal to the group was conducted by Misch, Over, and Carpenter (2014). Four- and 5-year-old children watched a video of two groups competing. The video was paused when it became clear that one of the groups was going to win. Children then watched as two members of the losing group spoke, in counterbalanced order. One individual stated that she would like to win, and therefore would leave her group in order to join the winning group (disloyal individual). The other individual stated that, although she would like to win, she would stay with her group (loyal individual). Thus, the loyal person had to sacrifice a personal benefit (winning) in order to remain loyal and stay with her group. Children were asked to judge the two individuals' niceness, trustworthiness, morality, and deservingness of a reward. Children at both ages favored the loyal over the disloyal individual, although this preference was more robust in the 5-year-olds.

We thus know that children positively evaluate loyal behavior, but we do not know whether they are loyal to the group themselves. Previous research has shown that even when children have knowledge of social norms, they do not necessarily follow them. For example, Smith, Blake, and Harris (2013) demonstrated that although 3- to 6-year-old children state that they and others should share equally, they themselves fail to do this when given the chance to share with another child (see also Blake, McAuliffe, & Warneken, 2014). To gain a fuller understanding of children's loyalty it is therefore important to investigate their actual loyal behavior to the group. The two studies that have investigated children's own loyalty to the group most directly were conducted by James (2001) and Nesdale and Flessner (2001). James (2001) interviewed 5- to 8-year-old children about their favorite sports teams. He found that 85% of the children predicted that their team preferences would not change

even if their team lost their games. Although this study is suggestive, following Smith et al. (2013) and Blake et al., (2014), there is little reason to assume that children's predictions about how they would act and their actual behavior will converge, especially when loyalty is costly. Indeed, Nesdale and Flessner (2001) directly assessed children's loyalty and showed that children were *not* loyal to the group when it incurred a cost in terms of status. They assigned 5- to 8-year-old children to either a high-status or a low-status group (allegedly based on drawing skills). Then, children were asked whether they would like to change their group. Children who belonged to the high-status group expressed their wish to stay with their group, while children who belonged to the low-status group (i.e., children for whom loyalty was costly) did not. In summary, findings using verbal measures of children's loyalty have produced mixed results and we do not yet know whether children are able to actually behave in a loyal way towards their own group.

The aim of the current study therefore was to investigate children's own loyal behavior, and to examine the extent to which children would remain loyal even when they have to pay a personal cost for the sake of the group. We assessed children's loyalty by testing their willingness to keep a group's secret. As mentioned above, one severe form of disloyalty can be telling a group's secret to an outsider. We know from previous research that even young children understand the importance of secrecy (at least at times). From the age of 4 years, they understand that some information is not appropriate for disclosure (Kim, Harris, & Warneken, 2014), and think that keeping a secret is an important indicator of a person's trustworthiness (Rotenberg, Michalik, Eisenberg, & Betts, 2008). Furthermore, children at this age are able to keep secrets in certain contexts themselves (Peskin & Ardino, 2003). Children's

willingness to keep a group's secret can thus be used as a measure of their loyalty to the group.

Children were assigned to novel, and minimal, color groups and then told a secret by two members of either their own group or their out-group, and were asked not to tell the secret to anyone. Then, a new, neutral character appeared and prompted children to disclose the secret, bribing them with stickers if they did not tell immediately. Thus, to be loyal, children would have to forego receiving the stickers that were offered in exchange for the secret information.

Our main interest was in 5-year-old children, as previous studies have shown that children around this age (1) show in-group bias in other contexts even when groups are minimal (Dunham et al., 2011; Dunham & Emory, 2014), (2) report feeling enduring preferences for real-world groups such as sports teams (James, 2001), and (3) value loyalty from a third-party perspective (e.g., Abrams et al., 2003; 2007; 2009; Castelli et al., 2007; Misch et al., 2014). In addition we also tested 4-year-olds because previous research has suggested an increase in understanding of loyalty between 4 and 5 years of age (Misch et al., 2014). We predicted that 5-year-old children would show loyalty to their group even when it incurred a cost. We did not have a strong prediction about the 4-year-olds; rather we were interested in exploring whether a similar developmental increase between 4 and 5 years would be seen in children's own loyal behavior as is seen in their understanding and evaluation of loyalty in others (Misch et al., 2014).

## Method

### Participants

**Five-year-olds.** We tested 48 five-year-old children (24 girls and 24 boys, age range 5;0;14 - 5;9;27,  $M = 5;5;02$ ). Four additional children were tested but

excluded for experimenter error (3) or failing the manipulation check at the end of the study (1; for more information see the Procedure section).

**Four-year-olds.** We also tested 48 four-year-old children (24 girls and 24 boys, age range 4;0;15 - 4;9;21,  $M = 4;6;19$ ). Thirteen additional children were tested but excluded for failing the manipulation check at the end of the study (7), camera malfunction (2), not responding at all (1), interruption of the procedure by a teacher or the child (to go to the restroom) (2), and experimenter error (1).

Children were recruited and tested in their daycare centers in a mid-sized city. No SES or ethnicity data were collected, but approximately 98% of the population from which the sample was drawn are native [blinded].

### **Materials and design**

Children were tested by three female experimenters: the moderator (M) and two puppeteers (E1 and E2). Each puppeteer played one female and one male hand puppet<sup>1</sup> (Figure 1). The two puppets played by E1 were the secret holders. In the in-group condition the child was allocated to the same group as the two secret holders and in the out-group condition the child was allocated to the other group. A fifth puppet, the briber “Siri” (Figure 2), was later played by M.

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<sup>1</sup> Numerous studies have shown that children at this age behave quite naturally with puppets and take their actions seriously (e.g., by imitating them and protesting when they violate social norms; e.g., Buttellmann & Böhm, 2014; Rakoczy, Warneken, & Tomasello, 2008; Wyman, Rakoczy, & Tomasello, 2009).



*Figure 1.* The puppets used in the study: a) The secret holders wearing yellow group markers, b) The puppets in the other group wearing green group markers.



*Figure 2.* Siri bribing the child with 5 stickers.

A set of green and yellow scarves (two puppet-sized scarves and a child-sized scarf in each color; see Figure 1) were stored in a box with a lid.

The group's secret was a brown, hardcover book with text but almost no pictures in it. A small stack of cardboard boxes was located on one side of the test room (on the right-hand side from the child's perspective, close to the wall) to serve as a hiding place. The stickers used to bribe children were colored circles in blue, red, green, and yellow (see Figure 2). The fifth and final sticker was red and heart-shaped. Thirty large marbles and a marble bag were also used to keep children occupied immediately prior to the telling of the secret.

Across children, we counterbalanced the color of the child's group (so that half of the children in each condition were in the yellow group, and the other half were in the green group) and the color of the secret holders' group (so that half of the time they were in the yellow group, and half of the time they were in the green group).

The puppets were a mix of boys and girls but the more active puppets in the study were matched to the child's gender. For example, when the participant was a girl, the girl puppets sat on either side of her during group allocation, and the secret holder puppet who asked the post-test question was female. The bribing puppet, Siri<sup>2</sup>, was also always matched to the child's gender.

### **Procedure**

Children were picked up by all three experimenters from their classroom. At the start of the procedure, there was a brief warm-up phase in which the child became acquainted with the adult experimenters and the four puppets who would later be allocated to groups. First, M introduced the child to the puppets and then asked the puppets to introduce themselves. Following this, M asked each of them two questions, either about what they had eaten for breakfast or about how they had travelled to the kindergarten that morning. This was done in order to make the child feel comfortable in the situation and to establish that the puppets should be treated as if they were children.

**Group allocation.** After the warm-up, M allocated the child and the four puppets to groups. She did this by saying "Today, we need two different groups. We will have a yellow group and a green group. First of all, we need to know which group everyone belongs to." M then picked up the box and explained that in this box

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<sup>2</sup> The name 'Siri' was chosen because it is not a very common name and so unlikely to be the child's name or the name of a close friend. It was also useful in that it could be used for both the female and the male puppet.

there were yellow and green scarves, and that she would now pull out one scarf for each of them, thereby finding out which group they belonged to. Then, one by one, she allocated each puppet and the child into groups by apparently randomly drawing yellow and green scarves out of the box and placing them on each individual's neck. Group allocation always started with the child's in-group same-gender puppet, then proceeded to the out-group same-gender puppet, then to the child, the out-group other-gender puppet, and finally the in-group other-gender puppet.

**Secret telling.** After the group allocation, M said that next they would need the marbles that were lying on the floor in one corner of the room. She noticed that the marble bag was missing and asked the child to come with her to look for the bag outside of the room. This was an excuse so that E1 and E2 could leave the room unseen and wait in an adjacent room. When M and the child returned with the marble bag, M pretended to be surprised that the others were missing and asked the child to put all the marbles into the bag while she looked for the others outside. When the child had just finished putting the marbles into the bag (as monitored by M on a video screen just outside of the room), the two secret holders entered the room, appearing not to notice the child. They were holding a book and looking for a place to hide it. They said, "The coast is clear! Let's find a place to hide the secret book of the yellow/green group!" They then appeared to notice the child and explained that this was their group's secret book. While doing so, they asked the child four times not to tell anyone about the book (e.g., "This is the secret book of the yellow/green group. You should not tell anyone about the secret book of the yellow/green group, ok?"). They showed the book to the child, and, after the child watched them hide the book behind the boxes, they left.

**Bribing.** A fifth, unfamiliar puppet entered the room, played by M. The puppet's gender matched that of the child and the puppet did not belong to either of the groups (he/she was not wearing a scarf). With a somewhat sneaky voice, the puppet introduced herself ("Siri") and asked the child for her name. Then Siri said, "I think the yellow/green group has hidden something secret here somewhere, and I want to know what it is. Will you tell me?" If the child refused to tell, Siri offered the child a sticker by placing it in front of herself and saying, "Look, I have a sticker here. You can have it if you tell me the secret of the yellow/green group." The sticker was taken out of an opaque paper bag (thus children could not see how many stickers were inside). If the child still refused to tell the secret, Siri offered the child up to five stickers in the same manner (Figure 2). Each time, if the child did not tell the secret, Siri waited 5 seconds before she offered the next sticker. When offering the fifth sticker, Siri informed the child that this was the final sticker ("This is the very last sticker"). If the child told the secret, Siri took the book out of the hiding place and admired it briefly before putting it back in place. If the child revealed both the location ("behind the boxes") and what the secret was ("a book"), the test phase ended. If the child mentioned only one of these, Siri directly asked for the other part ("Oh, a book! And where is it?" or "Oh, behind the boxes! And what is it?"). Before leaving, Siri put the child's stickers to the side and told the child that she could take them later. If the child refrained from telling the secret across all 6 trials, Siri put the stickers away and left.

**Supplementary Measures.** For exploratory purposes, we asked children some questions after the main test phase. After Siri had left, the same-gender secret holder puppet came back "to check on the secret book" and asked the child, "Did you tell anyone about our secret book?" After this, M (who was no longer holding Siri)

presented the child with photos of each of the five puppets in turn, in counterbalanced order, and, using a 5-point Likert scale depicting drawings of faces with expressions that ranged from very sad (1) to very happy (5), for each picture she asked, "How much do you like [puppet's name]; do you like her very much, a little bit, ok, not too much, or not at all?" while pointing to the corresponding faces on the scale. Finally, she also asked the child, "Did you tell Siri about the secret of the yellow/green group?" and "Why did you tell/not tell?" The results for these additional questions can be found in the supplemental materials.

**Manipulation Check.** Finally, M asked the children which group they belonged to. If, as sometimes happened, children named their daycare class group, M asked more specifically, "Are you in the yellow or the green group?" If children could not remember their group membership (even though they were still wearing the group marker scarf), they were excluded from the analyses (see Participants section).

**Debriefing.** After the experiment, E1 and E2 returned with their puppets, and together with M and the child they played with a marble run. If the child had given away the secret, the secret holder puppets additionally resolved the situation to ensure that the child had no reason to feel guilty: One of the puppets "realized" that she had mixed things up. She said that this book was not the secret book of their group, but just a book belonging to her sister that she had accidentally taken. She then openly showed the book to everyone. For children who had not given away the secret, this part was not necessary so the secret was not mentioned further.

Children did not receive any of the stickers they were bribed with. Instead, all children were given two very fancy stickers to take home as a thank you gift.

### **Coding and reliability**

Our main interest was in whether children kept or told the puppets' secret. In addition, for those children who told the secret at some point during the bribing, we also investigated how quickly they told it. For this analysis children received a score between 0 and 5: They received 0 if they told the secret immediately after Siri's first request, before she offered the first sticker. If they told the secret during the bribing phase, they received the score corresponding to the numbers of stickers that were offered in that trial (1-5). Thus, children who told the secret in order to get 1 sticker received a score of 1, and children who told the secret to get 2 stickers received a score of 2, and so on. To assess inter-rater reliability, an independent coder who was unaware of the hypotheses of the study coded a random sample of 25% of children from each age group for both measures together. Reliability (Cohen's weighted kappa) was excellent with  $\kappa = .99$ . Coding and results for the additional questions that were asked after the test phase was complete are described in the supplementary material.

### **Results**

Preliminary analyses revealed no effects of children's gender or color group on the results (both Fisher's exact tests:  $p = 1$ ). Therefore, we collapsed across these variables and do not consider them further.

Our main analysis investigated how many children kept, versus told, the secret at any point during the test phase. Overall, across both ages and conditions, the majority of children kept the secret (61%). Figure 3 shows the number of children who kept the secret for each age group and condition.

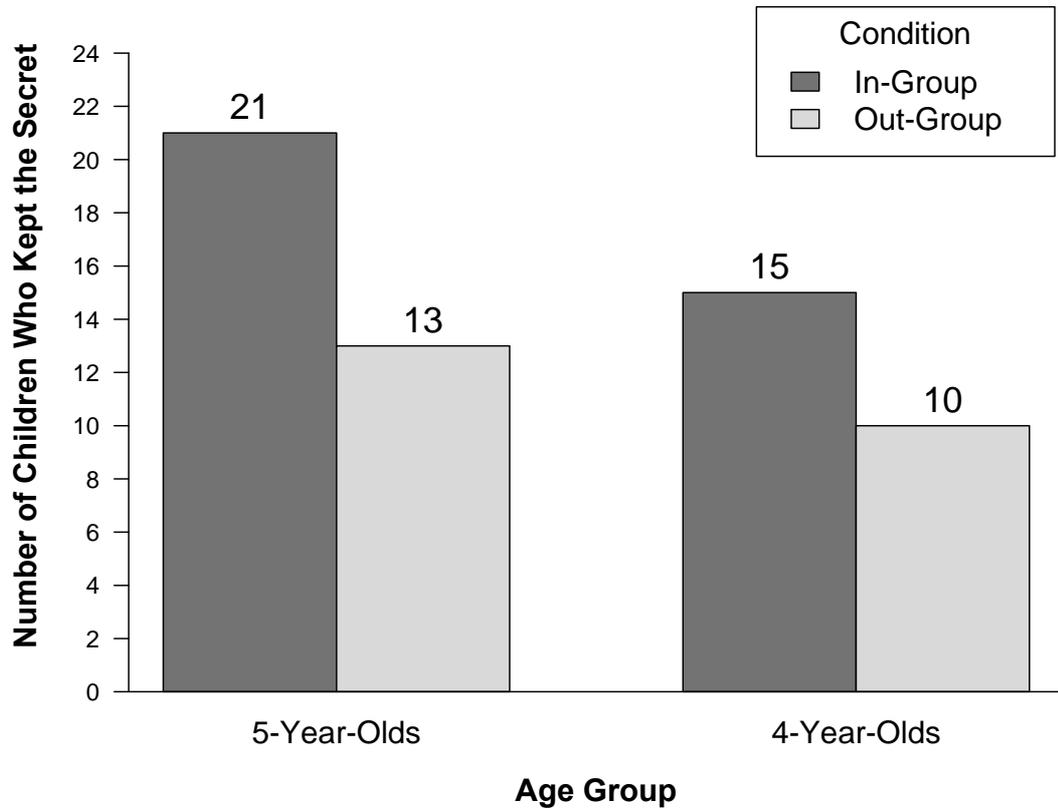


Figure 3. Number of children who kept the secret (out of a total of 24 in each condition).

To analyze the effects of age and condition on children's secret keeping, a Generalized Linear Model (GLM) was used with condition and age in years as factors, and the binomial measure of loyalty (i.e., telling the secret or not) as the response variable. The full model differed significantly from the null model ( $\chi^2(3) = 12.45, p < .01$ ). Results of the full model showed that there was no interaction between age and condition ( $p = .33$ ). The reduced model revealed a significant effect of condition (*Estimate* = -1.23, *SE* = 0.45,  $z = -2.72, p < .01$ , *Nagelkerke's*  $R^2 = .11$ ), indicating that, in general, children in the in-group condition (75%) were more likely to keep the secret than were children in the out-group condition (48%). The model also showed a

trend for age (*Estimate* = 0.88, *SE* = 0.45,  $z = 1.94$ ,  $p = .052$ , *Nagelkerke's*  $R^2 = .06$ ), indicating that 5-year-old children were marginally more likely (71%) to keep the secret than were 4-year-old children (52%).<sup>3</sup>

To check whether this pattern of results was present already in the first bribing trial, we analyzed how many children kept the secret after the first bribe. The full model differed significantly from the null model ( $\chi^2(3) = 9.74$ ,  $p < .05$ ). As in the main analysis above, we found no interaction between age and condition ( $p = .27$ ) but a main effect of condition (*Estimate* = -1.28, *SE* = 0.54,  $z = -2.38$ ,  $p < .05$ , *Nagelkerke's*  $R^2 = .10$ ). There was no effect of age ( $p = .14$ ). Thus, even after the first bribing trial, children in the in-group condition were more likely to keep the secret than were children in the out-group condition.

We were also interested in how susceptible children were to the bribing overall in each condition. Thus for those children who told the secret at some point, we analyzed their bribing score (see Figure 4). A GLM with Poisson distribution was run with age in years and condition as predictors on just these children. The full model did not differ from the null model ( $\chi^2(3) = 5.21$ ,  $p = .15$ ), indicating that neither age nor condition had an effect on how quickly children told the secret.

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<sup>3</sup> Results did not change when age (in days; z-transformed) was treated as a continuous variable: The null model differed significantly from the full model ( $\chi^2(3) = 12.03$ ,  $p < .01$ ), and there was no interaction between age and condition ( $p = .53$ ). The reduced model confirmed the main effect of condition (*Estimate* = -1.18, *SE* = 0.45,  $z = -2.62$ ,  $p < .01$ , *Nagelkerke's*  $R^2 = .10$ ) and revealed a main effect of age in days (*Estimate* = 0.46, *SE* = 0.23,  $z = 1.97$ ,  $p = .049$ , *Nagelkerke's*  $R^2 = .06$ ), suggesting that with age children become more likely to keep the secret.

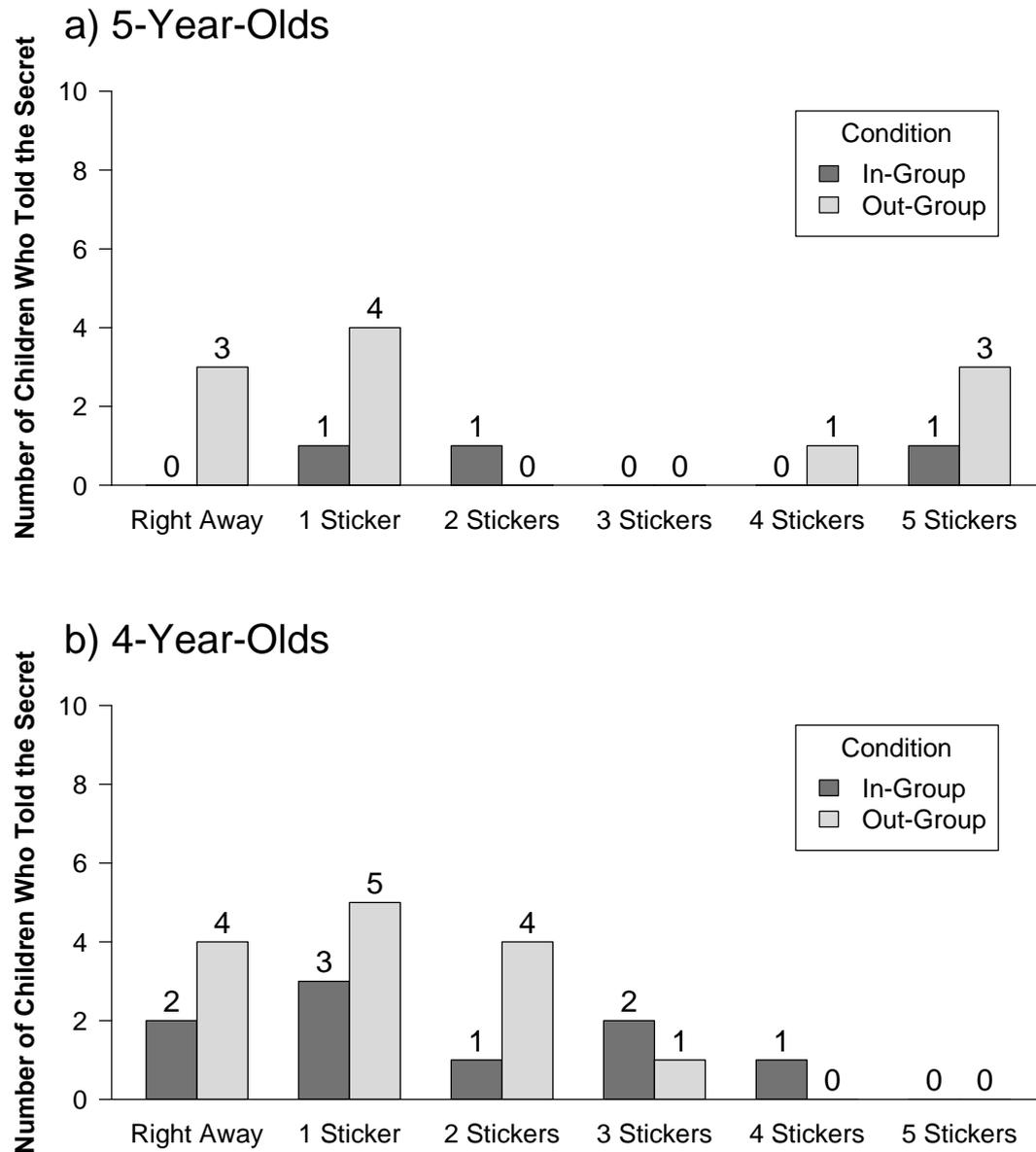


Figure 4. Secret telling in each bribing trial for a) 5-year-olds and b) 4-year-olds,  $N = 24$  in each condition at each age.

### Discussion

The aim of this experiment was to test whether young children show loyalty to their group. Results demonstrated that children were indeed loyal to their group: They were significantly more likely to keep a secret of their in-group members than a secret of out-group members. Remarkably, they were loyal even to the extent that

they were willing to sacrifice a number of personal benefits in order to keep the secret, and even though the group was a minimal color group they had been assigned to only a few minutes before.

This is the first study to demonstrate young children's own loyal behavior to the group in the strong sense of willingness to pay a cost to remain loyal. Previous research had suggested that children are not loyal to their group when this would mean incurring a personal cost, at least in terms of status (Nesdale & Flessner, 2001). In contrast to that, the present study suggests that children are sometimes willing to pay a cost in order to remain loyal to the group. These findings extend previous research on children's verbal predictions of their own loyalty (James, 2001) and children's attitudes about other people's loyalty (e.g., Abrams et al., 2003; Abrams et al., 2007; Castelli et al., 2007; Misch et al., 2014) in demonstrating that even in direct social interactions in which children are tempted to be disloyal, they can choose to remain loyal.

It is noteworthy that the current results are similar to those found by Misch et al. (2014) in a study of children's evaluations of individuals who were loyal vs. disloyal to their group in a third-party observation context. In that study, both 4- and 5-year-olds significantly preferred the loyal to the disloyal individual overall (although 4-year-olds' results were somewhat less robust). Thus, together, these studies suggest that already by four years of age children have begun to feel – and to expect others to feel – loyalty to their group. It is possible that other developments that are taking place in children's lives around this age contribute to children's growing understanding of loyalty. For example, around this age, children's experience with group life (e.g., in preschool classes) increases and their attachment to their social groups grows (e.g., Aboud, 2003; Dunham et al., 2011; Kinzler &

Spelke, 2011; Nesdale & Flessner, 2001). Relatedly, it may be that there is a transition from understanding commitments in dyadic interactions around the age of three (e.g., Gräfenhain, Behne, Carpenter, & Tomasello, 2009; Hamann, Warneken, & Tomasello, 2012) to more group-based commitments by the age of four to five. It is also possible that around this age children become better at anticipating how their in-group would react to disloyalty. For example, research has shown that 5-year-olds already care about and strategically manage their reputation around in-group members (Engelmann, Over, Herrmann, & Tomasello, 2013). In any case, as suggested by the similar pattern of results found in the current study and that of Misch et al. (2014), the emergence of children's understanding of loyalty appears to parallel closely the emergence of their own loyalty to the group. It would be interesting for future research to investigate whether this relation between understanding and valuing loyalty in others on the one hand, and children's own loyal behavior on the other, holds within individual children.

It is worth noting that the 5-year-olds were somewhat better at keeping the secret overall than were the 4-year-olds. These results are consistent with those found by Peskin and colleagues using a different task. They showed that although a majority of 4-year-olds are able to keep a secret, almost all 5-year-olds are able to do so (Peskin, 1992; Peskin & Ardino, 2003). A possible explanation for this transition is that a variety of relevant cognitive skills are developing in this age range, including inhibitory control and theory of mind. While inhibitory control is a cognitive ability that is connected to the ability to resist temptations (see, e.g., Metcalfe & Mischel, 1999), theory of mind helps children to understand the impact of telling the secret on another person's feelings and has been shown to influence children's ability to keep a secret (Peskin & Ardino, 2003).

These findings bring up several avenues for future research. Among other things, it would be interesting to examine what factors influence children's loyalty. For example, research with adults shows that higher identification with the group increases group loyalty (Ellemers, Spears, & Doosje, 1997; Zdaniuk & Levine, 2001). In the current study, children were allocated to novel groups just a few minutes before the test. The use of minimal groups in this study allowed us to control for such things as familiarity with the groups, previous experiences with group members, and the status, size, and performance of the groups. However, children may feel a stronger sense of identification with real-world groups, and thus may be even more loyal to these types of groups. Other research with adults suggests additional factors that might influence loyal behavior, such as a threat to the group (Branscombe, Wann, Noel, & Coleman, 1993) and group status, performance, and stability over time (see Levine & Moreland, 2002). It would be interesting to study the influence of these factors in children as well.

Furthermore, it would be informative to investigate the nature of the sacrifices children would be willing to make to remain loyal. For example, would children give up a valuable personal belonging for their group? Would they forfeit the opportunity to win by remaining loyal to their own group when it was losing in a competition? It would also be interesting to examine the impact of other non-material sacrifices, such as paying a cost in terms of reputation or opportunities for future interaction.

In summary, previous findings show that, at least by the age of five, children prefer members of their own group to members of other groups (e.g., Dunham & Emory, 2014; Rhodes, 2012) and understand some of the norms and obligations that come with membership in a group (e.g., Abrams et al., 2003; Killen, 2007; Schmidt, Rakoczy, & Tomasello, 2012). The current study extends these findings by

demonstrating that young children not only understand and value loyal behavior (e.g., Abrams et al., 2003; 2007; 2009; Castelli et al., 2007; Misch et al., 2014), but are also loyal to the group themselves. Their willingness to sacrifice a personal benefit to be loyal indicates the strength of their commitment to the group. Thus, from an early age, children can be reliable members of their social groups who can be trusted to stick with their group even in difficult situations.

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### Supplementary Material

For exploratory purposes, a number of supplementary measures were also collected. First, during the bribing situation, children's verbal and behavioral responses were coded in order to explore the different strategies children used to avoid disclosing the secret. Second, children's responses to the questions about whether they had told the secret, and why they had told or had not told, were coded to explore their reasons for keeping or disclosing the secret. Finally, children's responses to the questions about how much they liked each of the five puppets were coded in order to explore whether the bribing results were mediated by liking. The results for these measures are reported below in the order they appeared in the procedure.

#### Coding and Reliability

**Refusal strategies.** When children refused to tell the secret, they often used strategies or excuses in their interaction with the bribing puppet. These strategies were coded into the following categories: Two related strategies were *prohibition* (e.g., "They told me not to tell anyone") and *secret* (e.g., "I won't tell, it's a secret"). The other strategies involved *denial* (e.g., "The yellow group was not here", "I don't know where they hid it"), *distraction* (e.g., "You can play with the marbles"), *stickers* (e.g., "I don't want your stickers"), and *other* (all other responses, e.g., "You have to look for yourself", "Stop it now!"). Depending on children's behavior, the number of responses children gave for this measure varied between 0 (when children told the secret in the beginning or when children used no strategy or just repeated their refusal to tell; e.g., "No, I won't tell!") and 5. Some children used the same strategy across all trials, and some children used different strategies in different trials. Thus, we counted how many children used each particular strategy (and multiple categories per child were possible). A second coder who was unaware of condition coded 25% of

children in both age groups. Reliability for categories of responses was excellent ( $\kappa=.95$ ).

**Confessions to the secret holder.** After the main test, one of the secret holders asked the child the question: "Did you tell anyone about the secret book?" For only those children who had previously told the secret, responses were coded as *confessed* when children admitted that they had disclosed the secret to Siri (e.g., "yes"; nodding), as *denied* when children lied and claimed that they had not told the secret (e.g., "no"; shaking head), or as *no answer* when children did not respond or shrugged. Inter-rater reliability was perfect, with  $\kappa=1$ .

**Liking.** Children's responses to the smiley scale were coded with scores from 1 ("I don't like him/her at all") to 5 ("I like him/her very much") for each puppet (i.e., the two in-group puppets, the two out-group puppets, and Siri), separately. Inter-rater reliability was perfect, with  $\kappa=1$ .

**Confessions to the moderator and justifications.** At the end, in order to set up the next question, the moderator asked children: "Did you tell anyone about the secret book?" Children's responses were coded in the same manner as the confessions to the secret holder, and reliability for this coding was perfect ( $\kappa=1$ ). The moderator then asked the children why they told or did not tell the secret. Responses for disclosing the secret were divided into five categories: *Siri* (i.e., children's answer focused on Siri, e.g., "Because Siri wanted to know"), *stickers* (e.g., "Because I wanted the stickers"), *just because* (e.g., "Because I wanted to" or "Because I told it"), *devaluation* (i.e., declaring either the secret or the betrayal as unimportant, e.g., "There was only writing in the book"), or *no answer* (e.g., "I don't know," or when children said nothing).

Responses for keeping the secret (including the children who untruthfully claimed that they kept the secret) were divided into five categories: *prohibition* (e.g., "I was not allowed to," "The others asked me not to tell it"), *secret* (e.g., "It was a secret"), *just because* (e.g., "Because I didn't want to tell"), *other*, and *no answer* ("I don't know," or when children said nothing). Because some children gave more than one reason, some responses fell into multiple categories. Reliability coding for children's justification categories was perfect, with  $\kappa=1$ .

## Results and Discussion

**Refusal strategies.** When asked by Siri to reveal the secret, 87 children (91%) gave at least one refusal (sometimes before going on to reveal the secret later). Fifty-six percent of these children ( $N = 49$ ) gave a reason or used a particular strategy for their refusal. *Prohibition* was the most common reason given; it was used by 72% of these children. Twenty-two percent used *denial*, 8% referred to the *secret*, and *distraction* and *stickers* were used by 6% each. Fourteen percent also used various *other* refusal strategies (multiple categories per child were possible).

The strategies of referring to *prohibition* and *secret* show that children understood the restrictive nature of a secret and that they knew it was wrong to tell. Furthermore, the use of the other strategies indicates that children are already very creative when dealing with socially demanding situations.

**Confessions to the secret holder.** For the 37 children who told the secret at some point (39%), we were interested in whether they later confessed this to the secret holder or denied having told the secret. Most (78.4%) of these children denied telling the secret; 13.5% confessed and 8.1% gave no answer (see Table 1 for results reported separately for each age and condition).

Table 1

*Children's Responses to the Secret Holder's Question*

Age group	Condition	Confessed	Denied	No Answer
5-year-olds ( <i>N</i> = 14)	In-Group ( <i>N</i> = 3)	33.3%	33.3%	33.3%
	Out-Group ( <i>N</i> = 11)	9.1%	81.8%	9.1%
4-year-olds ( <i>N</i> = 23)	In-Group ( <i>N</i> = 9)	0%	88.9%	11.1%
	Out-Group ( <i>N</i> = 14)	21.4%	78.6%	0%

*Note.* The *N*s include only children who had told the secret.

The fact that most children lied to the secret holder shows again that children understood the restrictive character of a secret. Any differences between conditions are difficult to interpret due to small and uneven sample sizes in the different cells.

**Liking scale.** To see whether children's loyalty might have been driven by increased liking of their in-group, we analyzed whether children liked their in-group members more than their out-group members. However, there was no significant difference between the liking scores for in-group and out-group members in 5-year-olds ( $M$  score = 3.83 for in-group and  $M = 3.81$  for out-group puppets; Wilcoxon exact signed-rank test,  $p = .88$ ) or in 4-year-olds ( $M$  score = 3.72 for in-group and  $M = 3.51$  for out-group puppets; Wilcoxon exact signed-rank test,  $p = .23$ ). We also looked more specifically for a link between the degree of loyalty children showed, as measured by their bribing score, and any in-group bias they might have. The in-group bias score was created by calculating the difference between the liking scores for the in-group and the liking scores for the out-group puppets. It was then correlated with

children's bribing score. So that children who did not tell the secret could also be included in the analysis, we gave these children a score of 6. There was no correlation for either the 5-year-olds (Spearman's rank correlation,  $\rho = .125$ ,  $p = .393$ ) or the 4-year-olds (Spearman's rank correlation,  $\rho = -.207$ ,  $p = .156$ ). Thus children were not more loyal to their in-group members simply because they liked them more.

It is perhaps puzzling that no significant increased liking for the in-group was found in either age group. However, in hindsight, assessing group bias by asking about individual puppets, without any reference to their group membership, might have failed to reveal an existing in-group preference. This possibility is consistent with related work by Baron and Dunham (2015), in which children only showed in-group preference when tested using verbal group labels as opposed to just visual group markers without labels. Furthermore, children's liking of the puppets might have been influenced by the fact that this measure was always taken at the end of the session. These results should, therefore, be regarded with caution.

**Confessions to the moderator and justifications.** For the 37 children who told the secret at some point (39%), we were interested in whether they later confessed this to the moderator or denied having told the secret. In contrast to the way they responded to the secret holder, most of these children (81.1%) confessed to the moderator (see Table 2 for results reported separately for each age and condition).

Table 2

*Children's Responses to the Moderator's Question*

Age Group	Condition	Confessed	Denied
5-year-olds ( $N = 14$ )	In-Group ( $N = 3$ )	100%	0%

	Out-Group ( $N = 11$ )	81.8%	18.2%
4-year-olds ( $N = 23$ )	In-Group ( $N = 9$ )	66.7%	33.3%
	Out-Group ( $N = 14$ )	85.7%	14.3%

*Note.* The  $N$ s include only children who had told the secret. All children responded to the moderator's question.

Thus while children were very reluctant to confess their disclosure to the secret holder, they were, in general, truthful in their responses to the moderator. This suggests that children's denials to the secret holder were not driven by poor memory of their own behavior. Rather, it appears that children tried to hide their betrayal from the secret holders, as most of them had previously agreed to keep the secret and thus their reputation and trustworthiness were at stake. The moderator, on the other hand, had been in the room (playing Siri) during the betrayal, thus they might have reasoned that denying the betrayal to her made no sense because she already knew about their behavior.

The 30 children who had confessed their disclosure to the moderator were then asked why they told the secret. A majority (53%) of their responses referred to *Siri*, 23% referred to the *stickers*, and in 7% of the responses, children *devaluated* the secret or their behavior. Ten percent each fell into the categories *just because* and *no answer*.

Of the 59 children who kept the secret, 58 truthfully said that they kept the secret. When giving their reasons for not telling, most of the responses referred to *prohibition* (59%) and *secret* (26%). Remaining reasons were *just because* (10%), *no answer* (5%), and *other* (2%). Thus, again, most of these children showed that they clearly understood the restrictive demands of a secret.

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