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Preschoolers affect others' reputations through prosocial gossip

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Providing evaluative information to others about absent third parties helps them to identify cooperators and avoid cheaters. Here, we show that 5-year-olds, but not 3-year-olds, reliably engage in such prosocial gossip. In an experimental setting, 5-year-old children spontaneously offered relevant reputational information to guide a peer towards a cooperative partner. Three-year-old children offered such evaluative information only rarely, although they still showed a willingness to inform in a non-evaluative manner. A follow-up study revealed that one component involved in this age difference is children's developing ability to provide justifications. The current results extend previous work on young children's tendency to manage their own reputation by showing that preschoolers also influence others' reputations via gossip.

Virtually all theories of human cooperation require that cooperators find ways to interact with one another selectively, to the exclusion of cheaters (Tomasello, Melis, Tennie, Wyman, & Herrmann, 2012). Such selective interaction can take place on the basis of reputational judgements (Milinski, Semmann, & Krambeck, 2002; Sylwester & Roberts, 2010). Reputational judgements about others as cooperators can be based on either direct or indirect evidence (Nowak & Sigmund, 2005). Many animal species make reputational judgements of these kinds (Herrmann, Keupp, Hare, Vaish, & Tomasello, 2012; Subiaul, Vonk, Okamoto-Barth, & Barth, 2008), but humans add another dimension to the process: they gossip about others' reputations (Dunbar, 1996). Such sharing of reputational information allows for the selective identification of other cooperators even in anonymous large-sized groups and might have played a key role in the evolution of human language (Boehm, 2012; Dunbar, 1996).

Gossip is commonly defined as the sharing of evaluative information about absent third parties (Dunbar, 1996; Feinberg, Willer, Stellar, & Keltner, 2012; Sommerfeld, Krambeck, Semmann, & Milinski, 2007). Prosocial gossip is doing this in order to benefit the recipients of this information, especially to help them find cooperative partners and avoid uncooperative ones (Feinberg *et al.*, 2012). Very little is known about whether and how young children engage in prosocial gossip. This might be due to the fact that the methodology used with adults (Feinberg *et al.*, 2012; Sommerfeld *et al.*, 2007), so-called gossip notes, is not suitable for preschoolers. In addition, the few existing studies on the ontogeny of gossip have focused almost exclusively on older children. Results indicate that it is only in middle-to-late childhood that children start to engage in gossiping

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behaviour – there is little evidence for gossiping in children younger than 10 years of age (Fine, 1977; Ingram & Bering, 2010; Mettetal, 1983).

This relatively late onset of gossip is surprising, as preschoolers make reputational judgements in a variety of situations (Herrmann *et al.*, 2012). In addition, a wide range of studies show that children volunteer information to adults and peers from a young age onwards (Beier, Over, & Carpenter, 2014; Liszkowski, Carpenter, & Tomasello, 2008).

In the current studies, we investigated prosocial gossip in 3- and 5-year-old preschoolers. In Study 1, participants engaged in a sharing game with a specific rule about how many items to share. Children played the game with two puppets, one who consistently shared less than prescribed and one who shared the correct amount (negativity bias condition) or one who consistently shared more than prescribed and one who shared the correct amount (positivity bias condition). We then measured whether children passed on information about the puppets' behaviour (in the puppets' absence) to a same aged peer (a confederate) who could only play the game with one of the two puppets and thus had to pick one.

Study 1 had three aims. The first and central aim was to investigate whether preschoolers share information that is social in content, that is, information about past interaction partners. To this end, we identified utterances that transmitted social information and also the subset of those that were prosocial gossip (see coding section). Based on previous research (Beier *et al.*, 2014), we predicted that both 3- and 5-year-old children would share social information, but that only 5-year-old children would engage in prosocial gossip. Secondly, following Svetlova, Nichols, and Brownell (2010), we investigated what sorts of cues were necessary to elicit statements from preschoolers. Our third aim was to explore the nature of the produced gossip. We investigated whether a negativity bias, that is, a selective focus on the sharing of negative relative to positive information, would be present in preschooler's sharing of social information.

Study 2 was designed to explore the predicted age effect in preschooler's gossiping further. More precisely, Study 2 investigated whether one factor involved in this age difference would be children's developing ability and motivation to provide justifications. We predicted that 5-year-old children would provide more justifications than 3-year-olds.

STUDY 1

Method

Participants

Participants were 24 3-year-old children (age range = 39 months and 14 days to 44 months and 12 days; mean age = 42 months and 15 days; 12 girls) and 24 5-year-old children (age range = 63 months and 27 days to 68 months and 24 days; mean age = 66 months and 16 days; 12 girls). Twelve subjects participated in each condition.

Each participant was paired with a same-sex confederate (age range = 62 months and 7 days to 78 months and 26 days; mean age = 70 months and 12 days; four girls, six boys). Confederates were recruited from different day care centres than the participants (to ensure that they were unknown to each other).

Materials and design

Participants played a sharing game that consisted of a rectangular box (99 × 12 × 66 cm). The game was positioned in between the two players such that players could not see each other. Tokens could be shared by putting them in tubes (length:

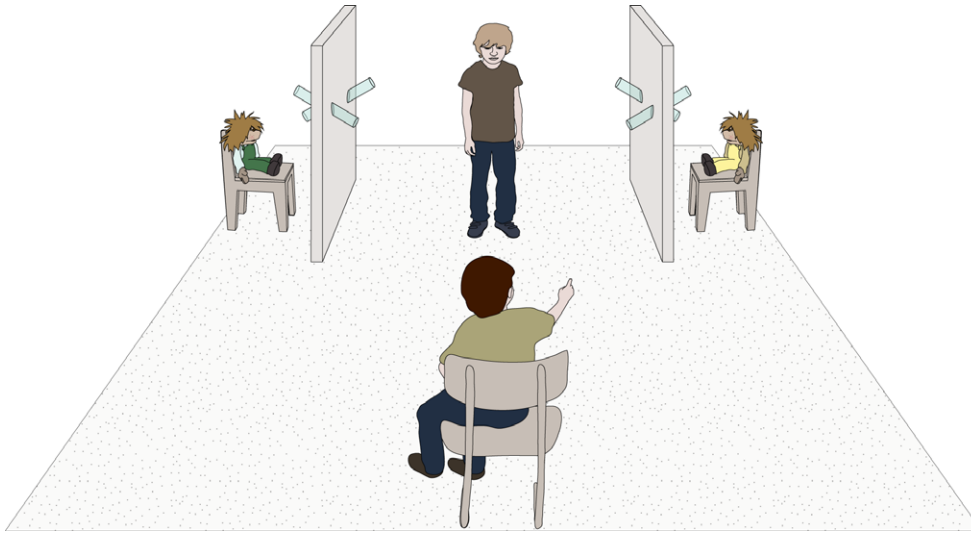

Figure 1. Experimental set-up during the test phase. The participant is seated on the chair, while the confederate stands in between the two games (Puppets are depicted for clarity only, they were outside the room at this point of the study).

25 cm) and sending them the other player via a duct (length: 60 cm; see Figure 1). Participants played the game consecutively with two puppets. To mark the two puppets, one puppet wore a yellow t-shirt and cap and the second puppet wore a green t-shirt and cap. We did not use coloured puppets (but striped and pointed puppets) for the 3-year-olds as pretests revealed that they had difficulties in overriding their colour preference. The study consisted of a 'positivity bias' condition and a 'negativity bias' condition. Each participant engaged in one trial of either condition.

Procedure

Before testing began, confederates were individually trained on multiple occasions. In particular, they were familiarized with a speaker system that allowed an experimenter (E4) to unilaterally communicate with the confederate throughout the study. In addition, the actual procedure of the study was practised several times with each of the confederates.

In total, four experimenters partook in the current study. E1 conducted the study; E2 and E3 played the two puppets; E4 guided the confederate throughout the study.

Introduction phase

On testing day, the experimenter (E1) entered the testing room with the participant and the confederate and explained to them the basic rules of the game. They were told that the aim of the game was to collect as many tokens as possible and that players with many tokens would receive a great present at the end of the game. Furthermore, both children were told that each player would get three boxes, each containing eight tokens and a tube. Then, E1 stated the central rule of the game: 'In this game, one shares at least four tokens in each tube with the other participant'.

Both children then played the game with E1, while the other child was watching. First it was the confederate's turn. E1 and the confederate shared three times four tokens with each other (the confederate had been instructed to share this amount during the training phase). E1 and the two children counted the tokens that E1 and the confederate had given to each other. Afterwards, the participant played with E1.

Next, E1 told the two children that each of them would play the game today twice: with the yellow and with the green puppet. E1 added that the participant could play first and so E4 took the confederate to a different room.

Game phase

The participant played, in counterbalanced order, with both puppets. After this, E1 told the participant that the puppets had to briefly leave but that they would return to play with the other child (the confederate) later on. Before leaving, both puppets left their caps and flags with their marks on their chairs. Then, E1 and the participant collected the tokens each of the puppets had shared.

In the *negativity bias condition*, one puppet shared according to the rule stated and shared three times four tokens. The other puppet disregarded the rule and shared three times one token. In the *positivity bias condition*, one puppet again shared three times four tokens. The other puppet behaved ultra-prosocially and shared three times seven tokens. The identity of the 'prosocial' and 'antisocial' puppet was counterbalanced across subjects.

In both conditions, E1 told the participant that she had finished the game now and because she had collected so many tokens, she would receive a present. Next, E1 announced that now it was the other child's (the confederate) turn to play and that the participant should remain seated on her chair. Before E1 left the room to pick up the confederate, she asked the participant two control questions, namely where each puppet had been sitting and how many tokens each had shared. If children failed to answer both questions correctly, E1 corrected them and repeated the questions.

Test phase

Once the confederate had entered the room, E1 looked at her watch and said that due to time reasons the confederate could only play with one of the two puppets (who were not in the room yet) and that she had to pick one. At this point, E4 called E1's name from outside the room and asked her for help. Before leaving the room, E1 told the confederate that she should pick one of the two puppets and sit down at the appropriate side. Once E1 had left the room, the confederate carried out the previously trained series of ordered prompts (from now on referred to as progression).

The progression consisted of five parts, each lasting 8 s (the confederate was equipped with an earphone that allowed E4 to guide her through the various steps via a speaker system). Importantly, at this point, the two puppets had not returned to the room yet. For each part, the confederate stood facing the participant at a distance of two metres. The prompts varied from gaze alternation between the two apparatuses (first phase) to a direct question: 'Which puppet should I play with?' (last phase; for details, see Appendix S1). Once the progression was over, the confederate sat down at the side indicated by the participant. If the participant did not share information, E4 told the confederate where to sit down via the speaker system. Then, E1 as well as the selected puppet reentered the room.

Coding and reliability

The first author coded the participants' behaviour from videotape. To this end, utterances that transmitted social information and also the subset of those that were prosocial gossip were identified. Social information and gossip were distinguished in the following way. Social information was defined as the sharing of any type of information that would allow the confederate to pick the more prosocial puppet. This included non-verbal communication such as pointing to where the prosocial puppet was seated, short verbal statements such as 'The green one', as well as longer statements such as 'Play with the green one because she shares more tokens than the yellow one'. A research assistant, who was unaware of the study design and hypothesis, independently coded 25% of all trials. Inter-rater agreement was perfect (Cohen's $\kappa = 1$).

Gossiping is more than just sharing social information (by, for example, in the current set-up, pointing to the prosocial puppet or stating 'Play with the green puppet'). It is the sharing of information that is unequivocally evaluative in nature (Dunbar, 1996; Foster, 2004). Crucially, this evaluation has to be based on objective evaluations rather than individual and idiosyncratic preferences (Sperber & Baumard, 2012). These two can be distinguished by considering the reasons given for the recommendation. We used a distinction common in philosophy between private and public reasons (Korsgaard, 2009). Private reasons are reasons that motivate an individual due to her individual preferences (e.g., adapted to the current study, 'You should play with the green puppet because green is my favourite colour'). Public reasons, at least theoretically, motivate every rational agent in the same way (e.g., 'You should play with the green puppet because she is more generous'). Consequently, children in the current set-up were coded as gossiping when they offered information to the confederate about which puppet to choose *plus* relevant additional information in the form of public reasons (e.g., 'You should play with the green puppet because the yellow puppet is stingy and does not share enough tokens'). As gossip was coded as a subset of social information, this implied that all utterances that were gossip were also social information, whereas others (e.g., 'Play with the green puppet') were coded as social information, but not gossip. Thus, one analysis was of social information and the other was of the subset of gossip. Inter-rater agreement for the occurrence of prosocial gossip was perfect (Cohen's $\kappa = 1$). In addition, we coded all instances of gossip as either involving a public reason that referred to the relatively less prosocial puppet (e.g., 'I would not play with the yellow puppet because she shares only one token') or to the relatively more prosocial puppet (e.g., 'Play with the green one because she gave seven tokens to me').

Finally, it was coded at what stage of the progression the participant shared relevant information with the confederate. Reliability on a random 25% of the sample was excellent, $\kappa = .95$.

Results

We report the results for three dependent measures. Our main analysis concerns the number of children who engaged in gossip or social information sharing. This is followed by two secondary analyses, looking (1) at the stage of the progression at which social information was shared and (2) at the type of reasons produced by 5-year-old children in the two conditions.

We found no effect of condition on children's provision of social information for any of the two age groups (3-year-olds, $p = .89$; 5-year-olds, $p = 1$; Fisher's exact test). Thus,

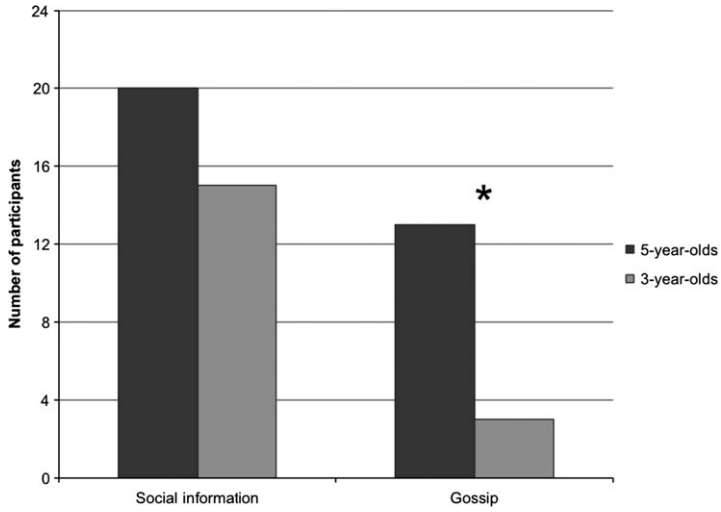

Figure 2. The number of participants who shared social information and engaged in gossip in Study 1. Social information refers to any information that allowed the confederate to pick the more prosocial puppet (including gossip). Gossip refers to a subset of social information that involves a public reason. Asterisks indicate significant differences between conditions (*p = .001).

children in the negativity bias condition did not share more social information (or gossip more) than children in the positivity bias condition. We thus collapsed the data for the 3-year-old and the 5-year-old children across condition.

As can be seen from Figure 2, 5-year-old children were significantly more likely to gossip than 3-year-old children (p = .001, Fisher's exact test). Both 5- and 3-year-old children readily shared social information (Figure 2). Five-year-old children were slightly more likely to share such information (20 of 24 children) than 3-year-old children (15 of 24 children), but this difference is not statistically significant (p = .19; Fisher's exact test).

As a secondary analysis, we investigated the stage of the progression at which social information was shared. We conducted a 2 × 2 analysis of variance (ANOVA) to investigate the effects of age and condition on this measure. This revealed a trend for the factor age – 5-year-old children shared social information more readily, that is, at earlier cue stages, than 3-year-old children, $F(1, 31) = 3.25$, $p = .081$, $\eta^2 = .095$ (Figure 3). There was no effect of condition, $F(1, 31) = 0.00$, $p = 1$, $\eta^2 = .00$, and also no interaction between age and condition, $F(1, 31) = .293$, $p = 0.59$, $\eta^2 = .009$.

Finally, zooming in on the reasons produced by 5-year-old in the negativity bias condition and positivity bias condition, we found that children were significantly more likely to produce public reasons referring to the puppet that had shared less tokens in the negativity bias condition compared to the positivity bias condition (p = .03; Fisher's exact test). For further information on the types of reasons produced by children, please refer to the Appendix S1.

Discussion

In Study 1, 5-year-old children engaged in prosocial gossip, defined as the sharing of social information in conjunction with a public reason, while 3-year-old children did not show

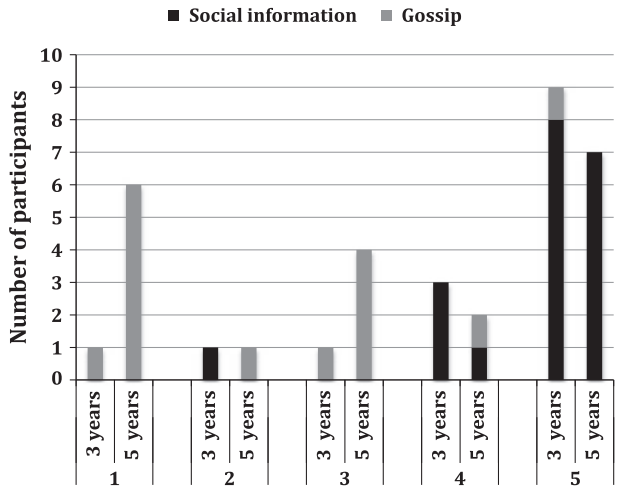

Figure 3. The number of participants who shared social information and engaged in gossip in Study 1 broken down by cue stage and age. Note that for reasons of clarity, gossip is not depicted as a subset of social information in this figure. Gossip refers to social information involving a public reason. Social information refers to any information that allowed the confederate to pick the more prosocial puppet (excluding gossip).

this behaviour to the same extent. Study 2 aims to narrow down the factors responsible for this age effect. In particular, Study 2 investigates whether the observed age effect is, at least partly, attributable to young children's developing ability to give justifications, not just in communicating about other agents (i.e., gossiping), but in any communicative context.

STUDY 2

To test whether 3-year-old children produce justifications in communicating about non-social entities, children of both age groups were presented with a set-up closely matching that of Study 1, but revolving around a malfunctioning machine rather than a pro- or antisocial agent. If 3-year-old children are as likely as 5-year-old children to produce justifications in this context, we can rule out that the age effect observed in Study 1 is a result of younger children lacking the cognitive skills to produce justifications (and thus, to gossip). If, on the other hand, we see a pattern similar to Study 1, namely that 5-year-old children are more likely to produce justifications than 3-year-old children also in this setting, then we can reasonably conclude that one factor involved in 3-year-olds lack of gossip is the ability to provide justifications.

In Study 2, the same apparatus was used, but children engaged in the game on their own: They had to throw a toy block into the apparatuses' duct. One apparatus consistently produced the expected number of pay-offs, whereas a second apparatus consistently produced less than expected. We measured whether both 5- and 3-year-old children would produce justifications in this non-social, stripped down version of Study 1.

Method

Participants

Participants were 24 3-year-old children (age range = 39 months and 14 days to 45 months and 9 days; mean age = 42 months and 13 days; 12 girls, 12 boys) and 24 5-year-old children (age range = 60 months and 23 days to 69 months and 2 days; mean age = 66 months and 14 days; 12 girls, 12 boys).

Each participant was paired with a same-sex confederate (age range = 59 months and 16 days to 76 months and 23 days; mean age = 69 months and 26 days; five girls, seven boys). As in Study 1, confederates were recruited from different day care centres than the participants.

Materials and design

The same apparatus as in Study 1 was used. However, instead of playing a sharing game, children played a game on their own. Toy blocks ($6 \times 3 \times 4$ cm) had to be thrown into the apparatuses' duct. This resulted in tubes containing tokens (the same tokens and tubes as in Study 1) being released on the other side of the apparatus. Participants played the game consecutively with two apparatuses, one marked in green and one in yellow colour. As in Study 1, we used striped and pointed marks for the younger children. Because there was no effect of condition in Study 1, we removed this manipulation from the design. All participants engaged in one trial.

Procedure

The procedure was kept as similar as possible to Study 1. Study 2 consisted of three different phases: introduction, game, and test. The *introduction phase* took place in a warm-up room. Participants and confederates were told that they had to collect as many tokens as possible and that tokens could be won by throwing a toy building block into the apparatus duct. E1 introduced the pay-off structure as follows: 'For every block that you throw in, you receive one tube containing four tokens'. Both children engaged in the game once, while E1 and the other child were watching. During the introduction phase, both children received four tokens in their tube.

Next, E1 told the children that each of them would play the game today twice: with the yellow and the green apparatus. At this point, a second experimenter entered the room and asked for the confederate to accompany him. E1 told the participant that because the confederate was gone, she could play the game first. E1 now took the participant to the testing room.

During the *game phase*, participants played, in counterbalanced order, three times with one apparatus and then three times with the other one. Once participants had finished playing, E1 and the participant collected the tubes participants had received in each of the apparatuses. The pay-off structure was identical to that of the negativity bias condition of Study 1 in that one apparatus consistently produced tubes containing four tokens and one apparatus consistently produced tubes containing only one token. Which apparatus produced the expected amount of tokens was counterbalanced across subjects.

E1 told the participant that she had finished the game now and because she had collected so many tokens, she would receive a great present. Next, E1 announced that now it was the other child's (the confederates) turn to play and that the participant should

remain seated on her chair. Before E1 left the room to pick up the confederate who was waiting outside the room, she asked the participant a control question, namely which apparatus had produced how many tokens. If children failed to answer correctly, E1 repeated the question.

At the beginning of the *test phase*, the confederate, who had been waiting outside the room, entered the test room. E1 looked at her watch and said that due to time reasons the confederate could only play with one of the apparatuses and that she had to pick one. At this point, an experimenter called E1's name from outside the room and asked her for help. Before leaving the room, E1 told the confederate that she should pick one of the apparatuses and sit down at the appropriate side (apparatuses were clearly identifiable thanks to the caps and flags used also in Study 1). Once E1 had left the room, the confederate carried out the previously trained series of ordered prompts (see Appendix S1 for details).

Coding and reliability

The first author coded the participants' behaviour from videotape. Utterances that transmitted information and also the subset of those that included justifications were identified. As in Study 1, information was defined as the sharing of any type of information that would allow the confederate to pick the more profitable apparatus. A research assistant, who was unaware of the study design and hypothesis, independently coded 25% of all trials. Inter-rater agreement regarding the sharing of information was excellent (Cohen's $\kappa = .95$).

In addition, it was coded whether participants produce justifications for their information (e.g., 'Don't play with the green game; you only get one token in each tube'). Inter-rater agreement for the occurrence of justifications (Cohen's $\kappa = 1$) was perfect.

Lastly, it was coded at what stage of the progression the informing of the confederate through the participant occurred. Reliability on a random 25% of the sample was perfect, $\kappa = 1$.

Results

As can be seen from Figure 4, 5-year-olds were significantly more likely to produce justifications than 3-year-olds ($p = .001$, Fisher's exact test). Both 5- and 3-year-olds readily shared information (Figure 4). Five-year-olds were slightly more likely to share such information (19 of 24 children) than 3-year-olds (17 of 24 children), but this difference is not statistically significant. An independent-samples *t*-test revealed that 5-year-old children ($M = 2.32$, $SD = 1.63$) shared information more readily, that is, at earlier cue stages, than 3-year-old children ($M = 4.24$, $SD = 1.2$, $t(33) = 3.97$, $p < .001$; see Figure 5). Only one 3-year-old child and one 5-year-old child recommended the less profitable apparatus.

Discussion

Study 2 investigated a potential mechanism underlying the age effect observed in Study 1 and found that children's developing ability to provide justifications likely plays a role in 5-year-old children's greater tendency to produce prosocial gossip compared to 3-year-old children.

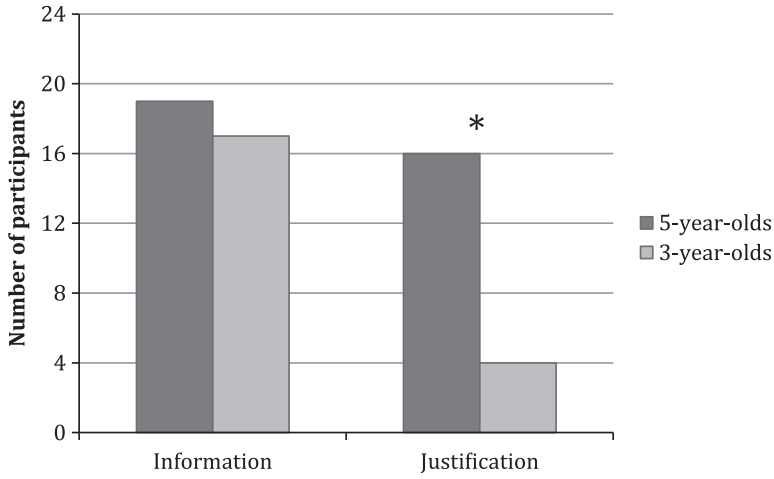

Figure 4. The number of participants who shared information and produced justifications in Study 2. Asterisks indicate significant differences between conditions (*p = .001).

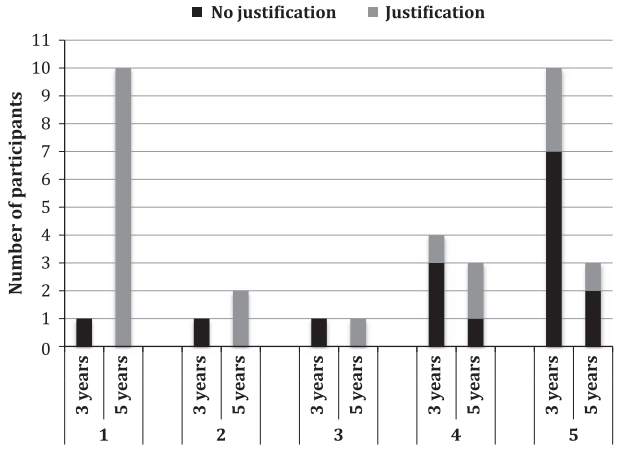

Figure 5. The number of participants who provided justifications in Study 2 broken down by cue stage and age.

GENERAL DISCUSSION

In the current study, we investigated prosocial gossip in preschoolers. The main finding was that already at preschool age children spontaneously gossip and offer helpful reputational information. A second finding was that 3-year-old children did not engage in this behaviour to the same extent as 5-year-old children. However, 3-year-old children shared information that is social in content, that is, information about other agents.

What factors are involved in the observed age effect regarding preschooler's gossiping? One such factor might be children's shyness. However, shyness is unlikely to account for the current findings, as 3-year-old children were just as likely to share social information as 5-year-old children. The fact that 3-year-old children shared social information as reliably as older children also precludes the interpretations of the current findings in terms of different levels of prosocial motivation. In other words, what differed

between the two age groups was not whether they informed the confederate but the way in which they did.

A third factor might be that 5-year-old children are more likely to give justifications than 3-year-old children, not just when referring specifically to social agents, but in any communicative context. Study 2 was designed to test this interpretation. Results show that older children are indeed more likely to produce justifications than younger children also when communicating about non-social entities.

Relatedly, development in theory of mind competencies might have made 5-year-old children more likely to provide justifications and thus to gossip. Three-year-old children might still experience difficulties differentiating between their own and others' epistemic states, potentially explaining why they provided information later and using fewer justifications than 5-year-old children. While a developing ability to provide justifications as well as limitations in theory of mind abilities is certainly part of the developmental picture observed in Study 1, we would argue that these are likely not the sole factors responsible for the age effect. Previous research has shown that children from the age of 3 years onwards spontaneously produce justifications in natural contexts, but only in situations where they are motivated to do so, most notably when it helps them to solve peer disputes (Eisenberg & Garvey, 1981; Kyratzis, Ross Shuqum, & Koymen, 2010; Sprott, 1992). Older children, but not younger children, might be motivated to produce justifications in the current context for two reasons.

One factor is children's developing understanding that communication partners engage in epistemic vigilance, that is, evaluate the soundness of a piece of information that they are offered (Bernard, Mercier, & Clement, 2012; Sperber *et al.*, 2010). Thus, 5-year-old children might be aware that they need to establish their trustworthiness as an information source and do so by providing sound reasons. In addition, the observed age effect might be a consequence of 5-year-old children's growing understanding that gossip can fulfil a crucial function: It can help them to make friends. On this interpretation, gossip serves as a signal that one adheres to prosocial or other relevant norms (Feinberg *et al.*, 2012). Taken together, the findings of Study 2 as well as previous studies on children's reasoning abilities suggest that both cognitive and motivational factors are involved in the age effect found in Study 1.

The finding that 3-year-old children readily share important social information shows that children at this age do not only understand and protest against norm violations (Rakoczy, Warneken, & Tomasello, 2008), but also pass on information about norm violators to third parties. However, to get from social information to gossip, informants have to offer more than a simple recommendation; they have to evaluate. While most 3-year-old children in the current study simply stated 'the pointed puppet' in order to inform the stooge about the prosocial puppet, many of the 5-year-old children added a justification to their advice, along the lines of '. . .because she always gave me more tokens and so maybe she will also give you more'. Only the latter is an unmistakable instance of prosocial gossip.

It is important to highlight that we used a relatively conservative measure of gossip in the current study. According to the criteria of adult studies on gossip (Sommerfeld *et al.*, 2007), also the 3-year-old children in the current study would be coded as gossiping. In addition, in some circumstances, even a pointing gesture (as shown by many of the younger children) might be called gossip if it is motivated by a public reason. However, we only coded those behaviours as gossip that unequivocally involved a public reason.

In the current study, we did not detect evidence for a negativity bias in children's gossip. This finding might be an effect of our particular experimental set-up. Children in

the current study possessed one piece of crucial information (which puppet had behaved more prosocially) and reliably passed on this information. In a more naturalistic setting, when children possess various pieces of positive and negative information, they might show an increased likelihood to gossip about the latter. In addition, because the rule in the current game was to share four tokens, strictly speaking, both in the negativity bias and in the positivity bias condition puppets violated a rule. Children might have interpreted both instances as deviations from a rule, thereby superseding any effect of condition. We did, however, find a negativity effect when zooming in on the public reasons produced by 5-year-old children. Specifically, children in the negativity bias condition were significantly more likely than children in the positivity bias condition to produce reasons referring to the relatively less generous puppet.

The current operationalization of gossip might be argued to miss some of the elements gossiping in a real-world situation commonly involves. These richer forms of gossip include a narrative aspect: telling stories about other people and not just an exchange of short pieces of information. In addition, gossip by definition contributes to the groupwide and public evaluation of a given individual (Sperber & Baumard, 2012; Tomasello, 2014), while the current study only involved an interaction between two agents. However, the operationalization of gossip in the current study, nevertheless, allowed us to directly tap into one of gossip's most important functions: acquiring important information about people that we do not know from direct experience.

Previous research has shown that from the age of 5 onwards children engage in self-presentational behaviours to improve their own reputation (Engelmann, Herrmann, & Tomasello, 2012; Engelmann, Over, Herrmann, & Tomasello, 2013; Fu, Heyman, Quian, Guo, & Lee, 2014; Leimgruber, Shaw, Santos, & Olson, 2012; Shaw *et al.*, 2013). The current study extends this line of research by showing that young children not only manage their own reputation, but also attempt to influence others' reputations via prosocial gossip.

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References

Beier, J. S., Over, H., & Carpenter, M. (2014). Young children help others to achieve their social goals. *Developmental Psychology*, *50*, 934–940. doi:10.1037/a0033886

Bernard, S., Mercier, H., & Clement, F. (2012). The power of well-connected arguments: Early sensitivity to the connective because. *Journal of Experimental Child Psychology*, *111*, 128–135. doi:10.1016/j.jecp.2011.07.003

Boehm, C. H. (2012). *Moral origins. The evolution of virtue, altruism, and shame*. New York, NY: Basic Books.

Dunbar, R. I. M. (1996). *Grooming, gossip and the evolution of language*. Cambridge, MA: Harvard University Press.

Eisenberg, A. R., & Garvey, C. (1981). Children's use of verbal strategies in resolving conflicts. *Discourse Processes*, *4*(2), 149–170. doi:10.1080/01638538109544512

Engelmann, J. M., Herrmann, E., & Tomasello, M. (2012). Five-year olds, but not chimpanzees, attempt to manage their reputations. *PLoS One*, 7, doi:10.1371/journal.pone.0048433

Engelmann, J. M., Over, H., Herrmann, E., & Tomasello, M. (2013). Young children care more about their reputations with ingroup members and potential reciprocators. *Developmental Science*, *16*, 952–958. doi:10.1111/desc.12086

Feinberg, M., Willer, R., Stellar, J., & Keltner, D. (2012). The virtues of gossip: Reputational information sharing as prosocial behavior. *Journal of Personality and Social Psychology*, *102*, 1015–1030. doi:10.1037/a0026650

Fine, G. A. (1977). Social components of children's gossip. *Journal of Communication*, *27*, 181–185. doi:10.1111/j.1460-2466.1977.tb01815.x

Foster, E. K. (2004). Research on gossip: Taxonomy, methods, and future directions. *Review of General Psychology*, *8*, 78–99.

Fu, G., Heyman, G. D., Quian, M., Guo, T., & Lee, K. (2014). Young children with a positive reputation to maintain are less likely to cheat. *Developmental Science*, *19*, 275–283. doi:10.1111/desc.12304

Herrmann, E., Keupp, S., Hare, B., Vaish, A., & Tomasello, M. (2012). Direct and indirect reputation formation in non-human great apes and human children. *Journal of Comparative Psychology*, *127*, 63–75. doi:10.1037/a0028929

Ingram, G. P. D., & Bering, J. M. (2010). Children's tattling: The reporting of everyday norm violations in preschool settings. *Child Development*, *81*, 945–957. doi:10.1111/j.1467-8624.2010.01444.x

Korsgaard, C. M. (2009). *Self-constitution: Agency, identity, and integrity*. Oxford, UK: Oxford University Press.

Kyratzis, A., Ross Shuqum, T., & Koymen, B. S. (2010). Validating justifications in preschool girls' and boys' friendship group talk: Implications for linguistic and socio-cognitive development. *Journal of Child Language*, *37*(1), 115–144. doi:10.1017/S0305000908009069

Leimgruber, K. L., Shaw, A., Santos, L. R., & Olson, K. R. (2012). Young children are more generous when others are aware of their actions. *PLoS One*, 7, e48292. doi:10.1371/journal.pone.0048292

Liszkowski, U., Carpenter, M., & Tomasello, M. (2008). Twelve-month-olds communicate helpfully and appropriately for knowledgeable and ignorant partners. *Cognition*, *108*, 732–739. doi:10.1016/j.cognition.2008.06.013

Mettetal, G. (1983). Fantasy, gossip, and self-disclosure: Children's conversations with friends. In R. Bostrom (Ed.), *Communication yearbook* (Vol. 7, pp. 717–736). Beverly Hills, CA: Sage.

Milinski, M., Semmann, D., & Krambeck, H.-J. (2002). Reputation helps solve the 'tragedy of the commons'. *Nature*, *415*, 424–426. doi:10.1038/415424a

Nowak, M. A., & Sigmund, K. (2005). Evolution of indirect reciprocity. *Nature*, *437*, 1291–1298. doi:10.1038/nature04131

Rakoczy, H., Warneken, F., & Tomasello, M. (2008). The sources of normativity: Young children's awareness of the normative structure of games. *Developmental Psychology*, *44*, 875–881. doi:10.1037/0012-1649.44.3.875

Shaw, A., Montinari, N., Piovesan, M., Olson, K. R., Gino, F., & Norton, M. I. (2013). Children develop a veil of fairness. *Journal of Experimental Psychology: General*, *143*(1), 363–375. doi:10.1037/a0031247

Sommerfeld, R. D., Krambeck, H.-J., Semmann, D., & Milinski, M. (2007). Gossip as an alternative for direct observation in games of indirect reciprocity. *Proceedings of the National Academy of Sciences of the United States of America*, *104*, 17435–17440. doi:10.1073/pnas.0704598104

Sperber, D., & Baumard, N. (2012). Moral reputation: An evolutionary and cognitive perspective. *Mind & Language*, *27*, 495–518. doi:10.1111/mila.12000

Sperber, D., Clement, F., Heintz, C., Mascaro, O., Mercier, H., Origgi, G., & Wilson, D. S. (2010). Epistemic vigilance. *Mind & Language*, *25*, 359–393. doi:10.1111/j.1468-0017.2010.01394.x

Sprott, R. A. (1992). Children's use of discourse markers in disputes: Form-function relations and discourse in child language. *Discourse Processes*, *15*, 423–439. doi:10.1080/01638539209544821

Subiaul, F., Vonk, J., Okamoto-Barth, S., & Barth, J. (2008). Do chimpanzees learn reputation by observation? Evidence from direct and indirect experience with generous and selfish strangers. *Animal Cognition*, *11*, 611–623. doi:10.1007/s10071-008-0151-6

Svetlova, M., Nichols, S. R., & Brownell, C. A. (2010). Toddlers' prosocial behavior: From instrumental to empathic to altruistic helping. *Child Development*, *81*, 1814–1827. doi:10.1111/j.1467-8624.2010.01512.x

Sylwester, K., & Roberts, G. (2010). Cooperators benefit through reputation-based partner choice in economic games. *Biology Letters*, *6*, 659–662. doi:10.1098/rsbl.2010.0209

Tomasello, M. (2014). *A natural history of human thinking*. Cambridge, MA: Harvard University Press.

Tomasello, M., Melis, A. P., Tennie, C., Wyman, E., & Herrmann, E. (2012). Two key steps in the evolution of human cooperation: The interdependence hypothesis. *Current Anthropology*, *53*, 673–692. doi:10.1086/668207

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Supporting Information

The following supporting information may be found in the online edition of the article:

Appendix S1. Detailed procedure and results.