A friend or a toy? Four-year-olds strategically demonstrate their competence to a puppet but only when others treat it as an agent

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Abstract

Others' beliefs about the self can powerfully influence our everyday interactions with others. Recent work suggests that even preschool-aged children are sensitive to what others think of the self and actively attempt to manage these beliefs (Asaba & Gweon, 2018). What cognitive capacities underlie these early self-presentational behaviors, and in what contexts do these behaviors emerge? Here we show that preschoolers strategically demonstrate their competence to even a *puppet,* but only when an adult treats the puppet as an agent and specifically asks which toy the child wants to "show" to the puppet (Exp.1). However, they do not show such strategic demonstration of their competence when the same puppet is treated as an object (Exp.2). These results suggest that self-presentational behaviors can emerge even in the absence of any immediate prospect of social evaluation insofar as children consider the target entity as capable of holding beliefs. Furthermore, whether or not children ascribe a belief about the self to the target is heavily modulated by how an entity is treated by others. We discuss the relevance of these findings to early reputation management behaviors, and more broadly, the use of make-believe agents in developmental research.

Keywords: cognitive development; social cognition; Theory of Mind; reputation management; agency

Introduction

What others think of us – our competence, kindness, fairness – is central in our minds. Others' beliefs about the self have the power to influence our social interactions, well-being, and even long-term life outcomes. Fortunately, we have some control over how others think of us: We can change our behaviors in the presence of others (e.g., act more generously; Novak & Sigmund, 2005) or actively disclose information about the self (Hicks, Liu, & Heyman, 2015). Knowing how to manage others' beliefs about us, or our reputation more broadly, can help us better navigate the complex social world and build healthy relationships with others. Despite the ubiquity of self-presentational behaviors, however, the ontogenetic origins of the ability to represent and modulate others' beliefs about the self remain poorly understood. What cognitive capacities underlie self-presentational behaviors, and in what contexts do these behaviors manifest?

Recent developmental work has provided some initial insights into young children's sensitivity to others' evaluations of them. Young children attempt to promote a positive reputation by sharing more and cheating less in the presence of others (e.g., Engelmann, Hermann, & Tomasello, 2012; Leimgruber, Shaw, Santos, & Olson, 2012) and try to maintain a positive reputation of being "smart" or "nice" (e.g., Fu, Heyman, Qian, Guo, & Lee, 2014). Their behaviors are further modulated by the potential social consequences; they share more when the observer could reciprocate their good deeds in the future than in one-time interactions (Engelmann, Over, Hermann, & Tomasello, 2013). These findings suggest that children care about others' evaluations and engage in behaviors to manage their reputations.

The ability to represent and reason about others' beliefs – Theory of Mind (ToM) – may be particularly important for effective self-presentational behaviors (Asaba & Gweon, 2018; Engelmann & Rapp, 2018; Silver & Shaw, 2018). By using an intuitive theory of others' minds, children can not only infer what others think of them, but also figure out what evidence could improve or maintain these beliefs. Surprisingly, however, there is little empirical support for ToM as a potential mechanism underlying self-presentational behaviors. Prior work in early reputation management behaviors has primarily manipulated whether or not children were being observed by another person. Thus, the role of ToM in self-presentational behaviors remains unclear; some self-presentational behaviors may only require the mere presence of others while more complex interactions may involve sophisticated inferences about the observer's beliefs.

A recent study provides suggestive evidence that preschoolers' self-presentational communicative behaviors depend on the content of others' beliefs about the self, rather than the mere experience of being observed by others (Asaba & Gweon (2018). Findings from this study suggested that 3- and 4-year-old children strategically presented their own competence depending on the observer's prior observations of their failures and successes, even when doing so meant foregoing an opportunity to teach new information to the observer. When the observer had seen the child's failures as well as their final success on a toy (i.e., believing the child can make the toy go), given a chance to demonstrate either the same toy or a toy she had never seen, children strongly preferred to demonstrate the novel toy. However, when the observer left before the child's final success (i.e., believing the child cannot make the toy go), children were more likely

to demonstrate their success on the same toy rather than the novel toy. Such selective demonstration of one's competence might require the ability to understand how others' observations of the self can generate certain beliefs in others' minds (i.e., "She thinks I cannot operate the toy") and the capacity to infer how additional evidence can change these beliefs (i.e., "demonstrating my success on this toy will make her think I can operate the toy").

These results suggest that children are sensitive to more than the mere presence of others; rather, their self-presentational actions can be *modulated* by representations of others' beliefs about the self. Following prior work on the early development of reputation management, Asaba & Gweon (2018) used a human confederate as the agent who observed children's failures and successes. However, if the process of ascribing beliefs to an observer can elicit reputation management behaviors, the target of such actions should not be limited to other human beings; these behaviors may also manifest in children's interactions with non-human entities, even if there are no real-world consequences to protecting or promoting one's reputation in front of them. If so, even the presence of *a puppet* in the room as children repeatedly fail to activate a toy would lead children to demonstrate their success (i.e., to "change the puppet's belief"), but only in contexts in which children would readily attribute beliefs to the puppet. In other words, the results from Asaba & Gweon (2018) should replicate even when the human confederate is replaced with a hand puppet, specifically when children consider the puppet as a social entity capable of holding a belief.

Decades of work on ToM provide reasonable support for this hypothesis. A large meta-analysis (Wellman, Cross, & Watson, 2001) has shown that children's responses in classic false-belief tasks do not systematically vary depending on the nature of the protagonist (i.e., a drawing, a hand puppet, or a real person); children are willing to attribute perceptual, epistemic, and emotional states to non-human, make-believe entities insofar as they are described and treated as sentient agents that think, feel, and act like humans. These classic ToM tasks usually require children to predict someone's action (e.g., Sally will go to where she thinks the ball is), but would children be motivated enough to share information about their own competence over novel information about a toy in such settings? Such results might attest to the power of mental-state reasoning that encourage children to engage in rich social interactions even with make-believe entities.

What factors may influence children's willingness to ascribe agency to various non-human entities? Prior theoretical work has proposed that children may evaluate an entity's *cognitive property* (Leslie, 1994) – that agents hold certain attitudes (e.g., desires, beliefs) to the truth of propositions. Interestingly, empirical work on children's understanding of agency suggests that children's agency attribution not only relies on the observable features of an entity (e.g., whether or not it has eyes; Johnson, Slaughter, & Carey, 1998) but also can be informed by how others communicate about it (e.g., how often parents talk about

psychological property of nonliving kinds; Jipson, Labotka, Callanan, & Gelman, 2018). Critically, adults often *depict* make-believe or imaginary scenes, objects, or agents to children as if they were real, and children readily understand such communicative intent and "play along" with them (Clark, 2016). Thus, children may ascribe agency to a puppet to the extent that other adults treat or depict it as an agent, especially one holding certain beliefs.

The main objective of the current work is to bridge prior work in Theory of Mind and reputation management by clarifying the role of belief-attribution in young children's self-presentational behaviors. To this end, our primary goal was to replicate the findings of Asaba & Gweon (2018) using a puppet that was introduced as the experimenter's "friend" and treated as such (Experiment 1). We predicted that children would go as far as demonstrating their competence to a puppet to change its "belief" about their competence when the adult experimenter treats the puppet as if it were an agent with mental capacities (i.e., with the *cognitive property*). We then provide additional evidence that such behavior is selective to contexts where children have reasons to consider the puppet as a social being capable of holding beliefs (Experiment 2).

Experiment 1: Puppet as Agent

In Experiment 1, we replicated Asaba & Gweon (2018) with 4-year-olds using the same design except that children were "observed" by a puppet rather than a human confederate. Importantly, the experimenter treated this puppet as an agent, calling the puppet her "friend" and referring to the puppet's mental states (i.e., ignorance) about the toys, similarly to how the confederate was treated in Asaba & Gweon (2018).

Methods

Participants 50 4-year-olds (M_{Age}(SD)= 4.49(.29), range = 4.01–4.99; 30 females) were recruited from a university preschool and randomly assigned to the Present (N=25) or Absent (N=25) condition. An additional 14 children were recruited but excluded due to failure on a memory check question (N=13) or technical error (N=1).

Materials We designed two distinct novel toys with different causal mechanisms that each lit up when activated (see Figure 1). The blue toy had two green buttons on the top; pressing the two buttons at the same time would make a rubber frog on the top of the toy light up. The yellow toy had two gray knobs on the left and right sides; turning the two knobs at the same time would make a rubber owl on the top of the toy light up. In reality, the toys were not actually functional but were activated by the experimenter with a remote control switch

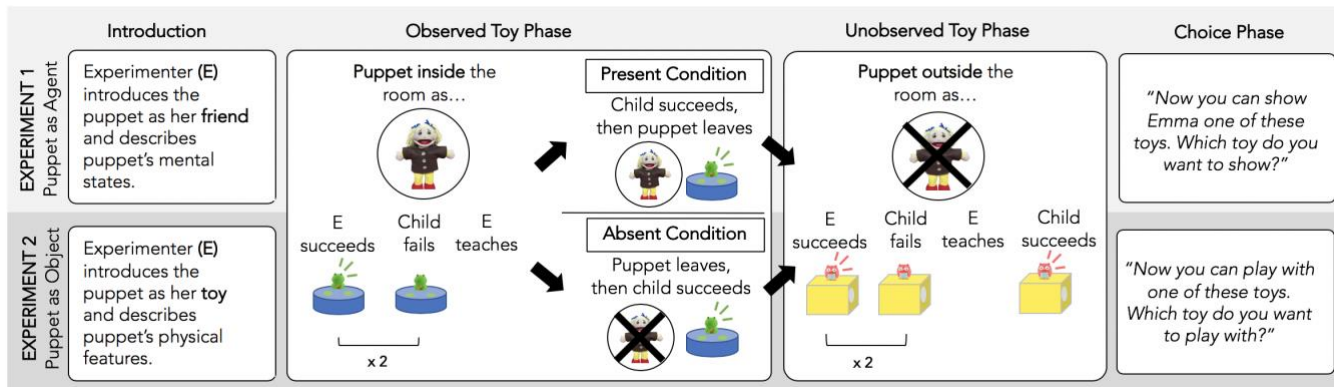Figure 1: Schematic of the toys used in Experiments 1 and 2.

Figure 2: Procedures for Experiments 1 and 2.

underneath the table hidden from the participants' view. A girl hand puppet and a 3" x 4" picture of the puppet was used.

Procedure Children were tested individually in a quiet room at their preschool. The child sat across from an experimenter at a rectangular table. The experiment consisted of the Introduction, Observed Toy, Unobserved Toy, and Choice Phases; only the Observed Toy Phase differed between conditions (see Figure 2).

Introduction Phase: The experimenter showed the child the two toys and said that her *friend* "Emma" (a hand puppet) would watch them play. The experimenter put the puppet on the table facing the child and asked the child to say hello to Emma. Critically, the experimenter described the puppet with respect to its mental states: "Emma has never seen these toys before, and she doesn't know anything about them."

Observed Toy Phase: The puppet "watched" as the child and the experimenter played with one of the two novel toys (i.e., the Observed Toy; blue and yellow toy counterbalanced across participants). The experimenter successfully activated the toy by pressing the two buttons simultaneously (blue toy) or turning the two knobs simultaneously (yellow toy). The child then attempted to operate the toy (i.e., the child pressed the buttons of the blue toy or turned the knobs of the yellow toy) but failed, and the experimenter acknowledged the failure by saying "Hm." The experimenter then succeeded on the toy again and the child failed again. Then, the experimenter instructed the child how to activate the toy: "You have to push this button and this button at the exact same time" (blue toy) or "…turn this and this at the exact same time" (yellow toy). Then, the child was given another chance and succeeded. The experimenter acknowledged the success by saying "Now you know how to play with this toy!"

The critical manipulation between conditions was when the puppet was in the room. In the Present condition, the puppet "watched" the child's initial two failures and final success, then the experimenter brought the puppet outside the room. In the Absent condition, the puppet "watched" the child's initial two failures but was then brought outside the room after the experimenter's instruction on the toy; next, the child succeeded. In both conditions, the experimenter said that "Emma has to go now," before bringing the puppet outside.

Unobserved Toy Phase: The child and experimenter played with the other toy (i.e., the Unobserved Toy) while the puppet was out of the room. The sequence of failures and successes and the experimenter's instruction were identical as in the Observed Toy Phase. The child first failed to activate the toy twice, the experimenter taught the causal mechanism, then the child succeeded. Then, the child successfully activated both the Observed Toy and Unobserved Toy twice more, ensuring that the child was confident in operating both toys.

Choice Phase: With the puppet still outside the room, the experimenter positioned the two toys equidistant from the child. The experimenter placed a photo of the puppet in front of the child and asked, "Now you can show Emma one of these toys. Which toy do you want to show?" Children responded by touching or pointing to one of the toys. Then, children were asked a memory check question, "Did Emma watch when you were playing with this toy or this toy?" Only children who correctly responded to this question (i.e., selecting the Observed Toy) were included in the final sample. At the end, the puppet was brought back into the room, and children demonstrated the chosen toy.

Results and Discussion

In the Absent Condition, the puppet only observed the child's failures, whereas in the Present Condition, the puppet observed the child's failures *and* success. Thus in the Absent Condition, the puppet had an *incorrect* belief about the child's ability on the Observed Toy. We predicted that children would choose the Observed Toy more often in the Absent Condition than in the Present Condition if they were able to track the puppet's beliefs about their abilities and wanted to improve these beliefs.

We ran a generalized linear model (family = binomial) with Condition (dummy coded; Present = 0, Absent = 1), Observed Toy Type (dummy coded; Blue Toy = 0, Yellow Toy = 1), and Age (continuous) as predictors: Toy Choice ~ Condition + Age + Observed Toy Type. We found that Condition significantly predicted children's choice of toys (β = 1.839, z = 2.762, p = .006), but Age (β = .618, z = .519, p = .604) and Toy Type (β = -.268, z = -.400, p = .690) did not. Follow-up analyses confirmed that participants chose the
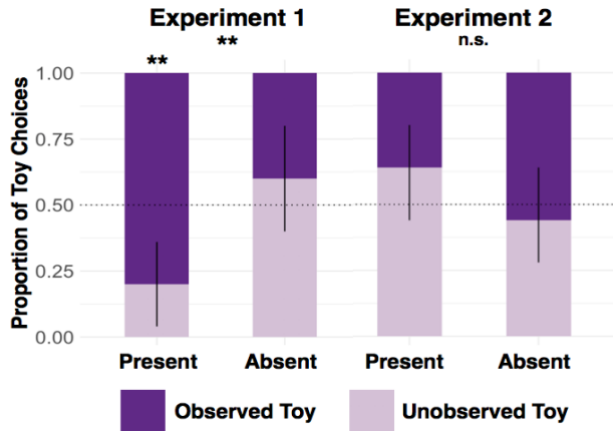
Figure 3: Results from Experiments 1 and 2. Error bars represent 95% confidence intervals. $^{**}p < .01$.

Observed Toy more often in the Absent Condition than in the Present Condition (% choosing the Observed Toy: 60% (Absent) vs. 20% (Present), $p = .009$, Fisher's Exact Test; see Fig.3). In the Present Condition, children strongly preferred to show the Unobserved Toy (80%, $p = .004$, Binomial Test), suggesting that they wanted to show the puppet a novel toy. In the Absent condition, however, children did not show a preference for either toy ($p = .424$, Binomial Test).

These results are in line with our main hypothesis that young children may go so far as to demonstrate their competence to a puppet when it is treated as an agent who is capable of holding beliefs. Specifically, when the puppet had only "observed" (i.e., was on the table facing the child) their failures but not their final success at operating a toy, children were motivated to demonstrate their competence by choosing the same toy to show the puppet, foregoing the opportunity to show a novel toy. These results are consistent with the literature on false-belief reasoning in preschoolers using puppets instead of human experimenters. However, it is nevertheless striking that children went as far as showing off their competence to a *puppet* that is incapable of any real-world social evaluation.

One critical prerequisite for such behaviors is the attribution of a belief state to the puppet. In Experiment 1, we provided a number of contextual cues to encourage children to consider the puppet as an agent, such as introducing the puppet as a "friend", verbally describing its mental states, and asking children to choose a toy to "show" the puppet. However, such behaviors would fail to emerge in the absence of any contextual support for ascribing agency to puppet, such that the puppet is no longer considered as an agent that is capable perceiving the environment or holding a mental state. In Experiment 2, we test this idea by asking whether the pattern of results in Experiment 1 would go away in a context where the puppet is treated as an object (i.e., the experimenter's toy) and children are asked to simply choose a toy to play with (rather than "showing" a toy to the puppet). Note that this is a control experiment where we expect a *failure to replicate* Asaba & Gweon (2018); critically, we

also predicted an interaction of condition (Present vs. Absent) and experiment (Exp.1: Agent vs. Exp.2: Object); this would provide additional support that children's representation of the puppet (as an agent vs. an object) modulates the pattern of results.

Experiment 2: Puppet as Object

Methods

Participants 50 4-year-olds (M_{Age}(SD) = 4.59(.31), range = 4.01–4.98; 27 females) were recruited from a university preschool and randomly assigned to the Present (N=25) or Absent (N=25) condition. An additional 28 children were recruited but excluded due to failure on the memory check.

Materials The same materials from Exp.1 were used.

Procedure The procedure was nearly identical to Exp.1, except for three critical modifications as described below, aiming to minimize the perceived agency of the puppet.

Introduction Phase: After introducing the two novel toys, the experimenter told the child that she had another *toy* (the puppet, which was introduced as a "friend" in Exp.1) and that she would put the puppet on the table as they were playing. Rather than referencing the puppet's ignorance about the toys, here the experimenter only described the puppet's physical features: "My puppet has blond hair and brown eyes. I also got the blue ribbons to tie my puppet's hair."

Observed Toy Phase: Children failed twice and succeeded once on the Observed Toy, and the Present and Absent conditions varied by whether the puppet was present for children's final success. In contrast to Experiment 1, the experimenter stated that someone else needed the puppet, rather than that the puppet needed to go. Additionally, the puppet's presence was emphasized at the beginning ("Now the puppet is on the table") and children helped bring the puppet outside the room to ensure that children were paying attention to the puppet. These changes were included to help children remember when the puppet was in the room.

Unobserved Toy Phase: Same as in Exp.1.

Choice Phase: The experimenter brought the puppet back onto the table. Importantly, the test question used in Experiment 1 (and in Asaba & Gweon, 2018; "Which toy do you want to show my friend?") implies that the puppet should be treated as an agent; using the same question would provide a strong signal to the child that the experimenter wants the child to "communicate" to the puppet. Thus, in Experiment 2, the experimenter asked instead: "Now you can play with one of these toys. Which toy do you want to play with?" while the puppet (instead of a photo of the puppet) was placed on the table, facing the child. We come back to the role of the final question in the General Discussion. However, we did use a similar memory check as Exp.1 by asking: "Was the puppet here on this table when you were playing with this toy or this toy?" Only children who correctly responded to this question were included in the final sample.

Results and Discussion

Here, the experimenter treated the puppet as her toy, and we predicted that if children's strategic self-promotion was sensitive to the nature of their "observer", then children would not strategically communicate to a puppet depicted as an object. Specifically, we predicted that there would be no difference in children's choices across conditions.

We ran the same generalized linear model as in Exp. 1 and found that Condition (β = -.747, z = -1.259, p = .208), Age (β =1.28, z = 1.232, p = .214), and Observed Toy Type (β = .603, z = .997, p = .319) did not predict children's choice of toys. Indeed, children chose the Observed Toy at similar rates in the Absent Condition and the Present Condition (% choosing the Observed Toy: 44% (Absent) vs. 64% (Present), p = .256, Fisher's Exact Test). Further, children did not selectively choose a toy in either condition (Present: p = .23, Absent: p = .69, Binomial Tests). Given the high rate of exclusion, we ran analyses including participants who failed the memory check question and found the same pattern of results: 53.4% (Present) vs. 38.9% (Absent) of participants chose the Observed Toy (p = .259, Fisher's Exact Test). As predicted, in this study, the results did not show a clear pattern for children's choice of toys as in Asaba & Gweon (2018).

The critical difference between experiments was whether the social context encouraged children to consider the puppet as an agent (capable of holding a belief) or an object. This allowed us to test the additional hypothesis that children would strategically choose which toy to show the puppet in a context where children had reason to attribute beliefs to the puppet (Exp.1), but not when it was treated as an object (Exp.2). To compare across experiments, we ran a generalized linear model (family = binomial) with Condition, Experiment, and Age (continuous) as predictors: Toy Choice ~ Condition * Experiment + Age. As expected, we found a significant Condition x Experiment interaction (β = -2.709, z = -2.709, p = .007), as well as significant main effects for Condition (β = 1.937, z = 2.608, p = .009) and Experiment (β = 2.013, z = 2.702, p = .007), but not Age (β = .816, z = 1.06, p = .289). The significant interaction between condition and experiment provides additional support for the idea that children's self-promotional behaviors are driven by the belief that children ascribe to the observer rather than the mere presence of an observer.

General Discussion

Across two experiments, we found that young children readily demonstrated their competence to a puppet, and that their self-promotional communication was modulated by the social context in which children interacted with the puppet.

As our primary goal, Exp. 1 provided a conceptual replication of Asaba & Gweon (2018). Remarkably, when a puppet had only observed their failures on a toy, four-year-olds demonstrated their success on the same toy to the puppet (rather than demonstrating a novel toy they played with in the absence of the puppet). This suggests that they attributed beliefs to the puppet about their own competence when the puppet was present for their failures, and they wanted to demonstrate their success to revise the puppet's (arguably false) beliefs. However, this pattern of results was found only in Experiment 1, when the experimenter treated the puppet as an agent and asked the child to demonstrate a toy to it; we did not find this pattern in Experiment 2 when the experimenter treated the puppet as an object and asked the child to choose a toy to play with.

Collectively, these results suggest that children are willing to engage in self-presentation behaviors to a non-human agent. Even though "losing face" in front of a puppet could not bear any foreseeable, real-world social consequences, children nonetheless tried to present positive information about the self (i.e., their success on the Observed Toy) instead of information about a novel toy (Unobserved Toy). Note that the puppet's belief was never explicitly mentioned; children inferred the belief from its "observations" of their own failures and successes and selectively provided evidence that might improve the puppet's beliefs. As irrational as these behaviors might seem, children were not indiscriminately showing off their competence to any entity; in the absence of any contextual cues to ascribe mental capacities to the puppet, children did not show these behaviors.

What makes children *want* to have a positive impression, even to a puppet? A large literature documents strong human desires to make positive impressions in the minds of others, regardless of age, gender, or culture. One perspective suggests that these attempts reflect a desire to build a shared reality with others (Harris, 2017); when children perceive gaps in knowledge or understanding between themselves and other people, they are motivated to remedy them by providing additional information. Our results provide additional support for this idea, and further show that the process of belief attribution (about the self) may be a key modulator of the motivation to preserve (good) or improve (bad) images of ourselves. Another theoretical perspective is that this motivation comes from the desire to be selected by others as social partners (Engelmann & Rapp, 2018). From this view, without the social pressure to be seen as desirable social partners, reputation management behaviors would not emerge. Our results do not necessarily contradict this view. Though there are no clear consequences to showing off to a puppet, children may still consider the pragmatic demands communicated by the experimenter or they may be motivated to practice self-promoting. Further, the desire to be accepted by others may be a more basic instinct even when people are not explicitly aware of them (Dweck, 2017).

More specifically, our task might have encouraged such behavior by asking children to "show" one of the toys to the puppet (although this was an ambiguous request either to show off or to teach novel information). By contrast, Experiment 2 provided little contextual support for these motivations to manifest. Although the two experiments were well matched in children's experiences with the toy and the time children spent in the presence of the puppet, Experiment 2 differed from Experiment 1 in two ways: the experimenter did not provide agency cues about the puppet and also asked the child to choose a toy to play with (rather than asking to

choose what to "show" to the puppet). Although this was an important design decision to prevent children from retrospectively attributing agency to the puppet ("showing" implies the ability to perceive), these results do not allow us to tease apart the relative importance of others' treatment of the puppet versus the nature of the final question.

An intriguing possibility is that even in contexts where adults initially treat the puppet as a toy, children might retrospectively ascribe a belief to the agent (see Király, Oláh, Csibra, & Kovács, 2018) when the experimenter asks which toy children want to "show" to the puppet. Such results might suggest that children are picking up subtle cues that reflect the ways adults communicate about the sentience of nonhuman entities (Weisman et al., 2017). Conversely, prior work in reputation management (e.g., Engelmann et al., 2012) suggests that children exhibit self-presentational behaviors even in the absence of explicit requests to communicate with their observer; thus, given clear evidence that adults treat the puppet as an agent (as in Exp.1), children might have still show similar self-presentational behaviors even when they are simply asked to choose a toy to play with. Future work might test the idea that adults' explicit treatment of the puppet and the nature of the final question might independently contribute to these behaviors.

Interestingly, the exclusion rate was noticeably high in Exp.2. It is possible that children may have not paid much attention to the puppet and subsequently had difficulty answering the memory question because of the social context. Understanding how children's memory might depend on the social context of their interactions is an area for future work.

Note that children were split between the Observed and Unobserved Toys in the Absent Condition in Exp. 1, as in Asaba & Gweon (2018). This might reflect genuine conflict between the desire to provide new information with the Unobserved Toy versus demonstrate their abilities on the Observed Toy; however, one might wonder if children were not considering the puppet's *beliefs* about their abilities, but simply wanted to show a success on either toy. While this still requires attributions of ignorance, ongoing work shows that when the confederate is fully knowledgeable about the toys in the Absent Condition, children selectively choose the Observed Toy, suggesting that they want to specifically revise the confederate's beliefs about their ability on that toy.

Broadly, these findings are consistent with the hypothesis that belief-reasoning capacities play a role in children's reputation management behaviors. Although work in Theory of Mind has traditionally focused on reasoning about others' beliefs about observable, objective physical states of the world (e.g., Wimmer & Perner, 1983), our work suggests that young children can also reason about beliefs concerning unobservable, subjective qualities of the self. Just as young children understand that others' observations (e.g., Anne *sees* the ball in the box) lead to others' beliefs (e.g., Anne *thinks* the ball is in the box, Wellman et al., 2001), they also understand that others' observations of their failures and successes informs others' beliefs about the self. Further, just as young children provide information to improve others'

beliefs about the world (e.g., Gweon, Shafto, & Schulz, 2018), children in this study actively provided information about the self given others' beliefs about the self.

However, although belief attribution was critical for children's strategic communication in our task, not all reputation management behaviors may require rich psychological reasoning abilities. Rather, some behaviors may be a response to the mere presence of others, and mental-state reasoning may be involved only in certain contexts where belief attribution is necessary to motivate the behavior (e.g., when children are attempting to *revise* others' beliefs about them). If this is the case, even among children who clearly employ some reputation management behaviors (e.g., cheating less when others are present), the individual differences in their ability to select appropriate information or action to change others' beliefs about their competence might positively correlate with their performance on standard measures of Theory of Mind.

Here, we took advantage of prior work suggesting children's willingness to attribute mental states to puppets (Wellman et al., 2001). Critically, whereas prior work has manipulated the physical features of an entity (e.g., Johnson et al., 1998), we manipulated how the experimenter *treated* it. Our findings suggest that children differentially perceived the puppet depending on the experimenter's interactions with it. Along with recent work suggesting that children attend to agency cues and interact with non-human entities accordingly (Breazeal et al., 2018), the ways in which adults *treat* entities (e.g., other humans, toys, pets, deities) might have deep consequences for how young children subsequently treat them. Further, it is possible that young children might use graded levels of agency (see Weisman et al., 2017) to determine what to communicate to others. Whether children might prioritize their reputations for those with greater mental capacities (e.g., robots over puppets, or adults over babies) is an open area for future work. Further work could also consider directly asking children to evaluate the perceived agency of the interlocutor that has varying degrees of cues to agency, and investigating how this perceived agency influences children's behaviors.

These findings may also be useful to researchers in cognitive development whose work utilizes puppets in their methodology. For many studies, puppets are more than just logistically convenient stand-ins for human experimenters; they are often a necessary piece of the methodology, especially for studies that must present properties of agents that are implausible in human adults (e.g., someone who does not know labels of simple household objects) or tricky to convey with human actors in experimental contexts (e.g., someone who attempts to climb a hill). A useful takeaway from the current results is that just as children attribute beliefs about the external world to puppets (e.g., location of Sally's ball, see Wellman et al. 2001), they also attribute rich beliefs about abstract qualities of the self such as competence or abilities; Four-year-olds readily attempted to change a puppet's beliefs as if it was human. Importantly, their tendency to treat a puppet as an agent may be critically

modulated by the ways in which the experimenter had treated it. One open question is whether children genuinely believe that the puppet is an agent, or whether they are perceiving the experimenter's communicative intent (i.e., the experimenter wants to communicate to the child that the puppet is a friend of hers) and therefore following along by engaging in a pretend play with the experimenter. Although the current work does not directly address this question, it is possible that children's reasons for attributing beliefs to a non-human entity depends on age (e.g., younger children may treat it as an actual agent, whereas older children are aware that they are make-believe but still engage in pretense).

What others think of us is deeply important for our everyday interactions with others, and the ability to reason about others' minds might allow us to reason about others' beliefs about us in savvy, sophisticated ways. Our findings suggest that children's strategic self-presentational behaviors are specific to the social context. Children do not promiscuously show off to anyone or anything; rather, they are sensitive to cues about the object's agency and specifically communicate about the self to other agents.

Acknowledgments

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