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Not So Innocent: Toddlers' Inferences About Costs and Culpability

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Abstract
Adults' social evaluations are influenced by their perception of other people's competence and motivation: Helping when it is difficult to help is praiseworthy, and not helping when it is easy to help is reprehensible. Here, we look at whether children's social evaluations are affected by the costs that agents incur. We found that toddlers can use the time and effort associated with goal-directed actions to distinguish agents, and that children prefer agents who incur fewer costs in completing a goal. When two agents refuse to help, children retain a preference for the more competent agent but infer that the less competent agent is nicer. These results suggest that children value agents who incur fewer costs, but understand that failure to engage in a low-cost action implies a lack of motivation. We propose that a naive utility calculus underlies inferences from the costs and rewards of goal-directed action and thereby supports social cognition.

Keywords
cognitive development, social cognition, theory of mind, open data, open materials

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The past decade has seen a revolution in scientists' understanding of psychosocial cognition in early childhood. Infants infer false beliefs (Kovács, Téglás, & Endress, 2010; Onishi & Baillargeon, 2005; Southgate, Senju, & Csibra, 2007); distinguish helpers, hinderers, and bystanders (Hamlin, Wynn, & Bloom, 2007; Kuhlmeier, Wynn, & Bloom, 2003); predict behavior on the basis of social dominance (Thomsen, Frankenhuis, Ingold-Smith, & Carey, 2011); and draw different inferences about actions according to whether they are directed toward in-group or out-group members (Baillargeon et al., 2014). However, little is understood about the computations that underlie these social judgments.

Here, we propose a new approach to thinking about social cognition in infancy, drawing on the insight that an understanding of goal-directed action lies at the core of social cognition. (See Carey, 2009, for a review.) We assume that this understanding is governed by a principle of rational action: the expectation that agents act efficiently to achieve their goals (e.g., Gergely & Csibra, 2003; Scott & Baillargeon, 2013). This can be understood as the assumption that agents act to minimize their costs and maximize their rewards. We suggest that sensitivity to agents' costs and rewards is part of a naive utility calculus that supports social cognition.

How might information about costs and rewards affect social judgment? Imagine that your neighbor, Sally, watches someone struggle to reach a package on a high shelf. Sally stands by and does nothing at all. Although there is no intrinsic relationship between height and moral worth, you may well judge Sally less harshly if she is 4 ft 11 in. tall than if she is a college basketball player.

What analysis underlies this judgment? We suggest that in predicting and evaluating behavior, people assume that the costs and rewards of an action jointly affect the likelihood that an agent will act. If the costs (e.g., in time and energy) that an agent is willing to incur to achieve a goal are known, it is possible to make inferences about the agent's potential subjective rewards (i.e., level of

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motivation). Conversely, if an agent's motivation is known, it is possible to infer the costs he or she might be willing to incur. These attributions trade off: If a highly motivated agent fails to act, one may infer that achieving the goal is too costly; conversely, if an agent does not pursue a low-cost goal, one may infer that the agent does not value it highly.

Inferences about agents' motivations are particularly influential in moral judgment (Cushman, 2008; Knobe, 2005; Young, Cushman, Hauser, & Saxe, 2007). Moral bystanders may be exonerated if a helpful action would have cost them dearly; they are likely to be judged harshly if they merely found helping insufficiently rewarding. Ambiguity arises when agents fail to perform costly actions or do perform low-cost ones. If Sally is 4 ft 11 in. tall, you can infer that the cost of reaching the shelf is high. This renders the motivation behind her failure to act ambiguous: Does she not want to help, or is helping too hard? By contrast, if Sally is a college basketball player, you can infer that she may not get much credit even if she does help get the package off the shelf. The costs are so trivial for her that her motivation to be helpful need not be high in order for her to act.

These kinds of considerations may be part of a naive utility calculus that, even early in development, is used to interpret goal-directed behavior. However, to date, no empirical work has looked at how differences in the cost of actions across agents affect children's judgments. In the experiments reported here, we tested the prediction that young children can estimate the costs associated with agents' actions and that this analysis affects their social evaluations of those agents.

In Experiment 1, we tested the basic premise that children are sensitive to the perceived cost of actions. We predicted that at baseline, children would prefer more competent agents over less competent ones. In Experiments 2 and 3, we looked at whether 2-year-olds can use differences in agents' costs to infer differences in their motivation. We predicted that if two agents refused to help, children would think that the less competent agent is more likely to be nice. Informed by developmental studies on comparable topics (e.g., Hamlin & Wynn, 2011; Kinzler, Shutts, DeJesus, & Spelke, 2009; Over & Carpenter, 2009), we predicted strong effect sizes in all the experiments and set our sample size at 16 for each condition (replacing excluded subjects).

Experiment 1: Early Competence Differentiation

In Experiment 1, we looked at whether toddlers distinguish agents who incur different costs (in time and effort) to achieve a goal and prefer agents who incur lower costs.

Method

Subjects. Twenty-four toddlers (mean age = 21.58 months, *SD* = 97 days, range = 17.1–28.5 months) were tested at an urban children's museum. Twelve additional toddlers were recruited but not included in the study because they declined to participate in a warm-up task, in which they were asked to choose between two stuffed animals.

Stimuli. Subjects were shown two puppets and a yellow cylindrical toy with a black button at the top. The toy played music when the button was pressed.

Procedure. Each subject was tested and videotaped in a quiet room at the museum. The child's parent was seated on a chair facing away from the testing table, and the parent was asked to hold the child over his or her shoulder. Thus, the child could see the stimuli, but the parent could not.

Once the parent and toddler were positioned, the experimenter presented the toy to the child and introduced the two puppets (positions of the puppets were counterbalanced across subjects). He said, "Here are my two friends! They are going to show you how the toy works." Both puppets were continuously present throughout the experiment, and they approached the toy (order counterbalanced across subjects) one at a time. When a puppet went to the toy, the puppet said, "It's my turn!" and then pressed the button. When the toy was activated, it played a song for approximately 7 s, while the puppet moved rhythmically to the sound, and then the puppet released the button. After releasing the button, the puppet who activated the toy said "Yay!" to celebrate the success (see Fig. 1). This procedure was repeated twice.

The puppets differed in how many attempts it took them to activate the toy. The more competent puppet (the competent agent) made the toy play music on the first attempt. The less competent puppet (the incompetent agent) tried several times to activate the toy (flattening his hand over the button but not depressing it fully). After the third or fourth failed attempt, he backed away to "look" at the button and then tried again. He made a few more failed attempts and then successfully activated the toy. (The total number of attempts ranged from five to eight across subjects, which allowed some flexibility in maintaining their attention to the task.) After the show, the parent was asked to turn around and to place the child at a marker on the middle of the edge of a lower table. The experimenter placed the two puppets on opposite sides of the table, equidistant from the child, and asked the child which one he or she wanted to play with.

Results

Each videotape was coded for inclusion by a coder blind to the child's choice. Five children were excluded from

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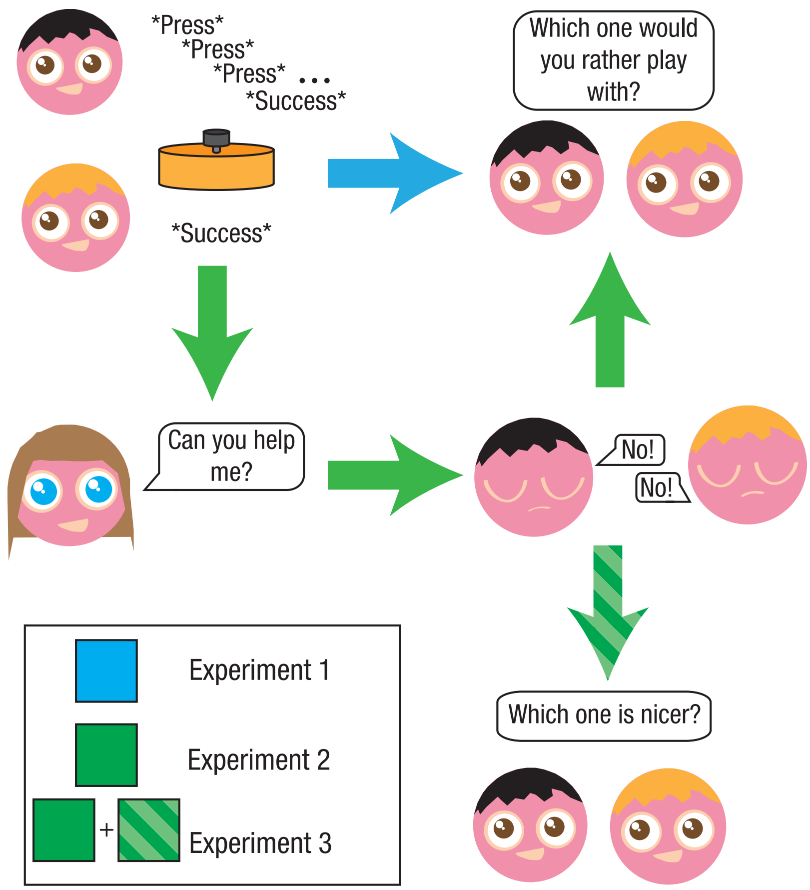

Fig. 1. Procedure for Experiments 1, 2, and 3. Children were introduced to two puppets and a toy. Taking turns, the puppets approached the toy and pressed the button on top, to try to make it play music. One puppet (the competent agent) was able to make the toy play music on the first attempt; the other puppet (the incompetent agent) succeeded, but only after many attempts. In Experiment 1, the children were asked which of the two puppets they would rather play with. In Experiment 2, after a child saw both puppets activate the toy, the child's parent turned around and asked each puppet for help with the toy. Both puppets refused. The child was then asked to choose one of the puppets to play with (as in Experiment 1). In Experiment 3, one condition replicated Experiment 2; a second condition was the same as Experiment 2 except that the child was asked which puppet was nicer; a third, baseline condition (not shown) followed the procedure of Experiment 1, except that the child was asked which puppet was nicer.

analysis: 3 because the coder judged that the puppets were not placed equidistant from the child and 2 because of parental interference. The coder then recorded the toddlers' first contact with a puppet following the prompt. If a child did not make a choice within a 30-s window following the prompt, the experiment was ended. Three children did not make a choice. Of the children who made a choice, 93.75% (confidence interval, CI = [87.5%, 100%][1]) preferred the competent agent (15 out of 16 subjects; see Fig. 2).

Discussion

In Experiment 1, toddlers strongly preferred the agent who achieved his goal more easily. Future research might establish whether toddlers' preference in this paradigm is driven by the agents' overall effort to achieve the goal, the time they take to achieve the goal, the greater ease of interpreting the more fluid actions, or a more abstract judgment about these factors as indices of competence per se. However, the results of Experiment 1 suggest that toddlers distinguish agents on the basis of diverse cues associated with the cost of goal-directed actions and prefer agents who incur fewer costs.

Experiment 2: Costs and Social Evaluations

In Experiment 2, we looked at how the cost of agents' actions affects toddlers' social evaluations. Because pilot

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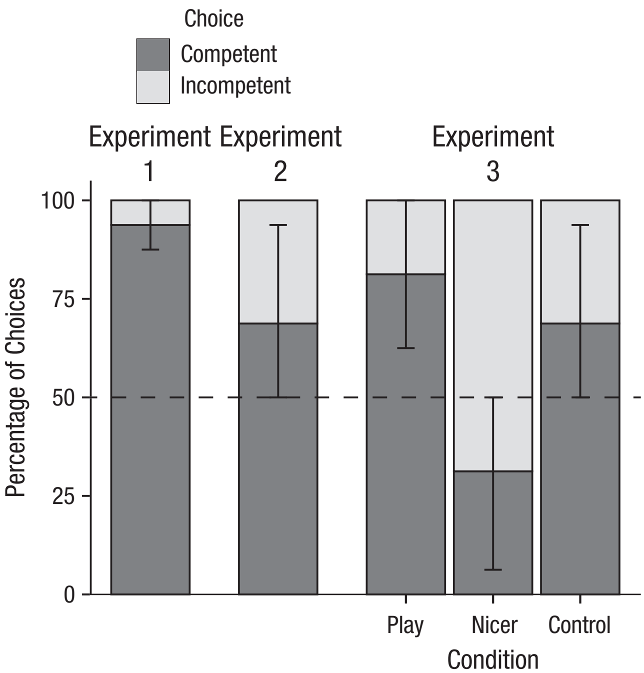

Fig. 2. Results from Experiments 1, 2, and 3: the percentage of children who preferred to play with the more competent agent (Experiments 1 and 2, play condition of Experiment 3) and who chose the competent agent as the nicer puppet (nicer and control conditions of Experiment 3). Note that in Experiment 2 and in the play and nicer conditions of Experiment 3, both agents refused to help activate the toy. Error bars represent bootstrapped 95% confidence intervals.

work suggested that the task in Experiment 2 was more demanding than the task in Experiment 1, we tested slightly older children.

Method

Subjects. Seventeen 2-year-olds (mean age = 2.64 years, *SD* = 84 days, range = 2.26–2.96 years) were recruited and tested at an urban children's museum. Five additional 2-year-olds were recruited but not included in the study because they declined to participate in a warm-up task, in which they were asked to choose between two stuffed animals.

Stimuli. The stimuli used in Experiment 2 were identical to the stimuli used in Experiment 1.

Procedure. Because the children in Experiment 2 were older than those in Experiment 1, they were given a choice between sitting in a chair or standing in front of the testing table, behind their parent's chair. Parents were asked to turn their back to the table so that both the puppets and the toy were out of sight, and they were given a script explaining the experimental procedure. (The experimenter also explained the script before parents entered the testing room, to ensure that they were willing to participate.) The beginning of the experiment was otherwise identical to Experiment 1 (see Fig. 1). As in Experiment 1, the experimenter introduced two puppets: One was able to activate the toy immediately; the other required five to eight attempts. Then the child was told, "Now your mom [dad] is going to turn around, pick up the yellow toy, and ask our friends a question." After turning around, as instructed in the script, the parent saw a single puppet and the toy; the other puppet was out of sight. As per the script, the parent looked at the puppet and asked, "Can you help me?" After the parent asked for help, the puppet looked at the toy and then at the parent. The puppet said, "No!" turned around, and hid under the table. This sequence was repeated with the second puppet (order counterbalanced). The question-and-answer procedure was then repeated with each puppet a second time.

After each puppet refused to help a second time, the experimenter took the toy from the parent and asked the child to stand on a marker in the center of the table's edge. As in Experiment 1, the experimenter placed the two puppets on the table equidistant from the child (left/right position was counterbalanced) and asked which one the child would rather play with.

Results

Each videotape was coded for inclusion by a coder blind to the child's choice, as in Experiment 1. If, in the coder's judgment, the puppets were not placed equidistant from a child, that child would have been excluded from analysis, but no children were excluded on these grounds. One subject was excluded from analysis because she refused to make a choice in the 30-s window. Thus, 16 children were included in the final sample.

Contrary to our prediction, the 2-year-olds in this experiment did not prefer the incompetent agent. Instead, they showed a bias toward the competent agent. Of the 16 toddlers who made a choice, 11, or 68.75% (CI = [50.00%, 93.75%]), chose the more competent agent (see Fig. 2).

Discussion

Why did the children not reject the competent agent, given his refusal to perform a low-cost helpful action? One possibility is that toddlers distinguish agents on the basis of the costs they incur, but fail to infer either that low costs entail an obligation to help or that high costs exonerate an agent from helping. A related possibility is that toddlers make categorical distinctions between classes of behavior (e.g., "helping," "not helping," and "hindering") but no distinctions within categories. That is, the toddlers in Experiment 2 might have distinguished the agents on the

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basis of the costs they would incur but found them equally blameworthy (because neither helped).

A final possibility is that the 2-year-olds inferred that the puppet who would incur higher costs was less culpable but preferred to affiliate with the agent who would incur lower costs. Indeed, an informal survey (see Methodological Details in the Supplemental Material available online) suggested that adults are split on analogous questions of this kind. When two agents refused to help, 44% (CI = [24%, 64%]) of the adults who took our survey preferred the less competent agent (e.g., "[the competent agent] sounds like a jerk. Why didn't he help?") and 56% preferred the more competent agent (e.g., "I'd rather have smart friends than not so smart."). To distinguish these possibilities, and to see if children's preferences are robust, in Experiment 3 we compared children's choice of which puppet they wanted to play with and their choice of which puppet was nicer.

Experiment 3

Method

Subjects. Sixty-six subjects (mean age = 2.48 years, *SD* = 114 days, range = 2.00–2.98 years) were recruited and tested at an urban children's museum. Thirteen additional 2-year-olds were recruited but not included in the study because they declined to participate in a warm-up task, in which they were asked to choose between two stuffed animals. Subjects were randomly assigned to a *play* condition, a *nicer* condition, or a *nicer baseline* (control) condition.

Stimuli. The stimuli used in Experiment 3 were identical to the stimuli used in Experiment 2.

Procedure. The procedure for the two test conditions (play and nicer) was identical to the procedure of Experiment 2 with two modifications. First, at the end of the experiment, subjects in the play condition were asked, "Which one would you rather play with?" (as in Experiment 2), whereas children in the nicer condition were asked, "Which one is nicer?" Second, we clarified the scenario to ensure that the children would interpret the parents' questions as requests for help rather than questions about the puppets' ability to help. In Experiment 3, after the first time both puppets refused to help, the experimenter told the children, "Neither of our friends *wants* to help your mom [dad] with the toy! Let's ask them one more time to make sure." After the second refusal, the experimenter reiterated, "Our friends do not *want* to help."

We predicted that the toddlers would judge the less competent agent as nicer. Alternatively, however, children might simply believe that less competent agents are nicer a priori. The nicer baseline condition allowed us to assess this possibility.[2] The procedure for this control condition was identical to the procedure of Experiment 1 with the exception that the experimenter introduced the puppets saying, "Here are my two friends! They are both going to play with the toy." At the end of the experiment, subjects in this condition were asked, "Which one is nicer?"

Results

Results were coded from videotape by a coder blind to the condition and the child's final choice. If, in the coder's judgment, the puppets were not placed equidistant from a child, that child would have been excluded from analysis, but no children were excluded on these grounds. One subject was dropped because of experimenter error, 2 were dropped because they left before the experiment concluded, and 5 were dropped because of parental interference. In addition, 10 children (2 in the play condition, 5 in the nicer condition, and 3 in the nicer baseline control) were excluded from analysis because they failed to respond in the first 30 s. Thus, the final sample included 16 subjects per condition.

Figure 2 shows the results from this experiment. In the play condition, 81.25% of children chose the competent agent (13 subjects; CI = [68.75%, 100%]). Thus, this condition replicated the findings of Experiment 2. By contrast, children in the nicer condition tended to choose the less competent agent. Of the 16 two-year-olds who made a choice, only 31.25% (CI = [6.25%, 50.00%]) chose the competent agent (5 subjects). That is, the subjects' choice of the competent agent dropped from 81.25% to 31.25% when they were asked to judge which agent was nicer (CI = [21.05%, 81.67%]; $p < .05$, Fisher exact test). Finally, subjects' performance in the nicer baseline condition suggests that this difference between the play and nicer conditions was not due to children's baseline belief that less competent agents are nicer. Whereas only 68.75% of subjects (11 out of 16) chose the incompetent agent in the nicer condition, 31.25% of subjects (5 out of 16) chose the incompetent agent in the nicer baseline condition, a decrease of 37.5% (95% CI = [6.17%, 71.03%]; $p < .075$, Fisher exact test). This suggests that toddlers do not simply assume that incompetent agents are sympathetic; rather, they take into account the relative cost of agents' actions.

When both puppets refused to help, the toddlers might have inferred that the less competent agent was nicer because they exonerated the less competent agent from performing a costly action, because they judged the more competent agent harshly for refusing to perform a low-cost action, or both. Further research might shed light on the precise inferences that underlie children's social evaluations in this paradigm. However, note that

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neither agent was canonically nice: Both agents explicitly refused to engage in a helpful action. If our subjects understood "nice" only with respect to nice, helpful behaviors, rather than with respect to internal motivations, then they should have chosen a puppet at chance or refused to answer. Instead, these 2-year-olds were able to use differences in the agents' costs to identify the nicer of two unhelpful agents.

General Discussion

Consistent with the idea that a naive utility calculus is integral to children's understanding of agents, our results showed that the cost of agents' actions affects children's social evaluations. Toddlers are sensitive to cues associated with the relative competence of agents and prefer agents who achieve goals quickly and easily. However, they evaluate agents differently in moral contexts; agents who refuse to perform helpful actions at relatively high cost are judged to be nicer than those who refuse to act at lower cost.

These findings are consistent with previous work suggesting that toddlers differentiate between agents who are unable and those who are unwilling to act prosocially. Children make more attempts to reach for a toy if an experimenter tries and fails to transfer it than if she is clearly teasing and unwilling to share the toy (Behne, Carpenter, Call, & Tomasello, 2005). Similarly, toddlers prefer to give a new toy to an experimenter who tries unsuccessfully to help than to one who teases and is unwilling to help (Dunfield & Kuhlmeier, 2010). These results suggest that toddlers distinguish agents' motivations and selectively reward helpful agents.

Our work extends these studies in two important ways. First, in the previous studies, there were unambiguous cues to the agents' motivations (e.g., sincere attempts vs. taunting). Even capuchin monkeys are sensitive to overt cues distinguishing unwilling and unable agents (Phillips, Barnes, Mahajan, Yamaguchi, & Santos, 2009). By contrast, in our study, the behavioral cues were informative only about the relative costs incurred by both agents; there were no direct cues to the agents' motivations. Additionally, note that in our study *both* agents were able and *both* were unwilling to perform the helpful action; only the cost difference supported the possibility that one agent was unmotivated to help whereas the other was merely unwilling to incur high costs.

The naive utility calculus may support adults' intuition that incompetent agents are more sympathetic than competent agents. (Compare your feelings of empathy when an elderly man and a macho 24-year-old both walk into a wall; Cikara & Fiske, 2012). It is relatively easy to recognize when competent agents are unmotivated to be helpful (because their competence is not in question) but difficult to recognize when they are highly motivated (because easy tasks require little motivation). By contrast, it is relatively easy to recognize when incompetent agents are highly motivated to help (they must be if they help even though it is difficult for them) but difficult to recognize when they are unmotivated. Therefore, given potentially ambiguous evidence, people are more likely to infer that an agent is not nice if they know that the agent is competent and more likely to infer the agent is nice if they know that the agent is incompetent. Although at baseline 2-year-olds believed that the agent who would incur low costs was nicer, future work might test the speculation that over time, inferences supported by the naive utility calculus lead to the adult intuition that less competent agents are more likely to be nice.

Our finding that children generally prefer competent agents is congruent with work in the domain of epistemic trust suggesting that children prefer reliable agents (Birch, Akmal, & Frampton, 2010; Birch, Vauthier, & Bloom, 2008; Einav & Robinson, 2011; Gweon, Pelton, Konopka, & Schulz, 2014; Jaswal & Neely, 2006; Koenig, Clément, & Harris, 2004; Kushnir, Vredenburgh, & Schneider, 2013; Nurmsoo & Robinson, 2009; Pasquini, Corriveau, Koenig, & Harris, 2007; Robinson & Whitcombe, 2003; Sabbagh & Baldwin, 2001; Sobel & Corriveau, 2010; Sobel & Kushnir, 2013). However, such studies (with one exception—Pasquini et al.) have pitted good informants against bad ones without looking at relative competence. Pasquini et al. did look at children's ability to make graded judgments and found that children younger than 4 fail to track agents' reliability across independent trials. In the current experiments, however, we did not vary the probability of success across trials; we varied the amount of effort agents needed to expend in order to succeed. Thus, the toddlers only had to encode the agent-specific effort associated with achieving the goal. However, because we provided redundant cues to the costs of the agents' actions (e.g., the time spent pressing the button and the number of button presses), we do not know the extent to which the toddlers' preferences were driven by each individual cue, or if their choices were guided by a more abstract representation of competence. Future research can shed light on the full range of cues people use to infer agents' competence.

The current study suggests that children are sensitive to the cost of actions early in development. At an age when children themselves are still largely incompetent and exonerated from moral responsibility, their ability to understand cues to how competence and moral responsibility might bear upon one another suggests remarkably sophisticated inferential abilities and highlights the importance of building a new theoretical synthesis for understanding the development of social cognition.

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Author Contributions

All authors developed the study concept. J. Jara-Ettinger and L. E. Schulz designed the study. Testing and data collection were performed by J. Jara-Ettinger. J. Jara-Ettinger analyzed the data under the supervision of L. E. Schulz and J. B. Tenenbaum. All authors helped interpret the data and write the manuscript. All authors approved the final version of the manuscript for submission.

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Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

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Supplemental Material

Additional supporting information can be found at http://pss.sagepub.com/content/by/supplemental-data

Open Practices

All data and materials have been made publicly available via Open Science Framework and can be accessed at https://osf.io/z9ikh/ and https://osf.io/3jiyw/, respectively. The complete Open Practices Disclosure for this article can be found at http://pss.sagepub.com/content/by/supplemental-data. This article has received badges for Open Data and Open Materials. More information about the Open Practices badges can be found at https://osf.io/tvyxz/wiki/view/and http://pss.sagepub.com/content/25/1/3.full.

Notes

1. All reported CIs are 95% confidence regions estimated through a basic nonparametric bootstrap of the data using 500,000 samples.
2. We are grateful to an anonymous reviewer for suggesting this control condition.

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