Brief Report

Children show heightened memory for threatening social actions

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ABSTRACT

Three experiments investigated whether a negativity bias in social perception extends to preschool-aged children's memory for the details of others' social actions and experiences. After learning about individuals who committed nice or mean social actions, children in Experiment 1 were more accurate at remembering who was mean compared with who was nice. In Experiment 2, children showed a memory advantage for the specific details of actions committed by mean individuals compared with nice individuals. In Experiment 3, children exhibited better memory for the details of mean actions compared with nice actions when the vignettes were presented from the perspective of the recipients instead of the perpetrators of these actions. Taken together, these findings suggest that children show heightened memory for the details of negative social actions over positive social actions. Such a memory bias may be advantageous in helping children to predict potentially threatening situations in the future.

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Introduction

Across a variety of domains, adults attend to, remember, and weigh negative information over positive or neutral information (e.g., Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001; Cimpian, Brandone, & Gelman, 2010; Ito, Larsen, Smith, & Cacioppo, 1998; Rozin & Royzman, 2001). Models of affective perception propose that this "negativity bias" may be an evolutionarily adaptive

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mechanism designed to protect individuals from harmful situations (Cacioppo & Berntson, 1994; Kensinger, 2007).[1] As an illustration, adults weigh negative information more heavily than positive information when forming impressions of others (e.g., Skowronski & Carlston, 1987). Adults also detect angry faces more quickly and efficiently than they detect neutral faces (Hansen & Hansen, 1988; Öhman, Lundqvist, & Esteves, 2001) and show heightened memory for individuals described as cheaters compared with individuals described as trustworthy (Chiappe et al., 2004; Mealey, Daood, & Krage, 1996; Suzuki & Suga, 2010).

If the negativity bias functions to help people quickly learn about potentially dangerous situations, one might expect it to emerge early in ontogeny because young children are physically vulnerable and have limited knowledge of the safety of different aspects of their environment. Indeed, beginning in infancy, social referencing (vicarious learning through observation of others' emotional reactions) is guided primarily by displays of negative emotion rather than positive emotion (Hornik, Risenhoover, & Gunnar, 1987; Mumme & Fernald, 2003; Mumme, Fernald, & Herrera, 1996; for a review, see Vaish et al., 2008). Although older infants' social evaluations of others are influenced by both positive and negative social information (Hamlin, Wynn, & Bloom, 2007), infants' attention to negative social information appears to be developmentally privileged, emerging as early as 3 months of age (Hamlin, Wynn, & Bloom, 2010). By early childhood, the negativity bias guides social perception in multifaceted ways. For example, like adults, preschool-aged children detect angry or sad faces more rapidly than they detect neutral or happy faces (LoBue, 2009). Negative social information also plays a prominent role in children's learning from others; children distrust individuals who have been incompetent in the past, but they do not necessarily trust individuals with a past history of competence (Koenig & Jaswal, 2011).

In the study that provided the motivation for the current research, 4-year-old children exhibited better face memory for threatening individuals than for helpful individuals even when visual properties of the faces were held constant (Kinzler & Shutts, 2008). In this paradigm, children viewed a series of faces that were described as either "mean" or "nice." "Mean" individuals were described as perpetrators of threatening actions, whereas "nice" individuals were described as agents of helpful actions. At test, each face was presented alongside a novel distracter face, and children were asked to choose which face they had seen previously. Children displayed better recognition memory for the "mean" faces. Interestingly, a face memory advantage was not observed for individuals who were negatively valenced but not threatening; children displayed no significant memory advantage for individuals described as "sad" versus "happy."

The findings from Kinzler and Shutts' (2008) studies provide evidence that knowing that an individual is threatening can influence children's memory for faces. Nevertheless, several open questions remain concerning the nature and scope of children's attention to and memory for threatening social information. In particular, children's enhanced face memory for mean individuals over nice individuals does not specify which information children encode about the threatening targets. For instance, children might simply recognize the faces of mean individuals without remembering the valence of the actions these individuals committed. Alternatively, children might remember the valence associated with a particular actor (i.e., whether he or she was nice or mean) without remembering any specific details about his or her particular actions (e.g., whether the actor pushed someone on the playground or kicked someone in the hallway). Simply tagging an individual as globally "mean" could suffice to protect against future negative interactions with that individual even without specific memory of the actions he or she committed. Finally, it is possible that children may show heightened memory for the specific actions committed by threatening individuals. This more sophisticated mechanism would allow children not only to remember the identity of threatening individuals but also to make specific predictions about threatening individuals' future behavior, thereby allowing children to monitor and avoid social threat in nuanced ways.

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[1] Investigators have proposed that this negativity bias works in concert with a positivity offset (Cacioppo & Berntson, 1994). As a baseline, neutral or unfamiliar stimuli are often treated as positive; for example, children assume that unknown individuals have positive qualities (Boseovski, 2010). This positivity offset can be helpful in orienting people toward new experiences and allowing them to explore their environments. Once negative information is available, however, it often has more pronounced effects on attention, memory, and emotion than does positive information (Vaish, Grossmann, & Woodward, 2008).

The current research investigates these possibilities by testing the scope of children's memory bias for threatening social information. Across three experiments, preschool-aged children were presented with the same vignettes about positive and negative social actions as used in previous research (Kinzler & Shutts, 2008). Experiment 1 compared children's memory for whether individuals were "mean" versus "nice." Experiment 2 tested whether children show a memory bias for the specific actions that were performed by mean versus nice individuals. Experiment 3 investigated children's memory for the same positive versus negative social actions when learning about the recipients rather than the perpetrators of these actions.

Experiment 1

During the familiarization phase of Experiment 1, 4-year-old children were introduced to a series of faces. Each face was described either as "mean," having committed an antisocial act, or "nice," having committed a prosocial act (as in Kinzler & Shutts, 2008). In a subsequent memory test, children were asked to recall whether each individual was "nice" or "mean." We predicted that children would show heightened accuracy when remembering the valence associated with targets previously described as "mean" versus "nice."

Method

Participants

A total of 32 4-year-olds (12 boys and 20 girls, mean age = 52.5 months, range = 48.5–57.0) participated in this experiment. Participants were predominantly White and lived in middle- to upper middle-class neighborhoods.

Procedure

Participants were familiarized with photographs of eight child faces (four boys and four girls). Faces were White and displayed neutral expressions. Faces were presented in series (6 s each) on a laptop computer while the experimenter provided a name, trait label ("nice" or "mean"), and associated behavior. Four faces (two male and two female) were described as "nice" (e.g., "Kimberly is always nice. Today she brought in cookies and everyone got some"), and four were described as "mean" (e.g., "Ashley is always mean. Today she stole everyone's cookies and no one got any"), in alternating order (see Appendix A for a full list of the facts presented). The order and pairings of faces and facts presented during familiarization were counterbalanced across participants. Immediately after familiarization, children viewed each face again in a new order and were asked whether each person was nice or mean (e.g., "Was Kimberly nice or mean?").

Results and discussion

Children performed above chance overall at remembering whether each face had been described as "nice" or "mean" (chance = 50%, $M_{\text{all trials}}$ = 66.02%, SE = 3.38), $t(31)$ = 4.74, $p < .001$, d = 0.84. Critically, children were more likely to respond correctly when asked about individuals who previously had been described as "mean" compared with those who previously had been described as "nice" ($M_{\text{mean trials}}$ = 72.66%, SE = 3.78, $M_{\text{nice trials}}$ = 59.38%, SE = 4.86), $t(31)$ = 2.42, $p = .02$, d = 0.43 (see Fig. 1, left).

Our results indicate that children's enhanced memory for threatening social targets extends beyond the face memory advantage demonstrated in past research (Kinzler & Shutts, 2008). In Experiment 1, children correctly remembered that an individual was mean more often than they correctly remembered that an individual was nice. Thus, it appears that children do not simply recall faces of mean individuals without any knowledge of why these individuals are memorable; in addition to preferentially remembering the faces of mean versus nice individuals (Kinzler & Shutts, 2008), children remember that these individuals were in fact mean.
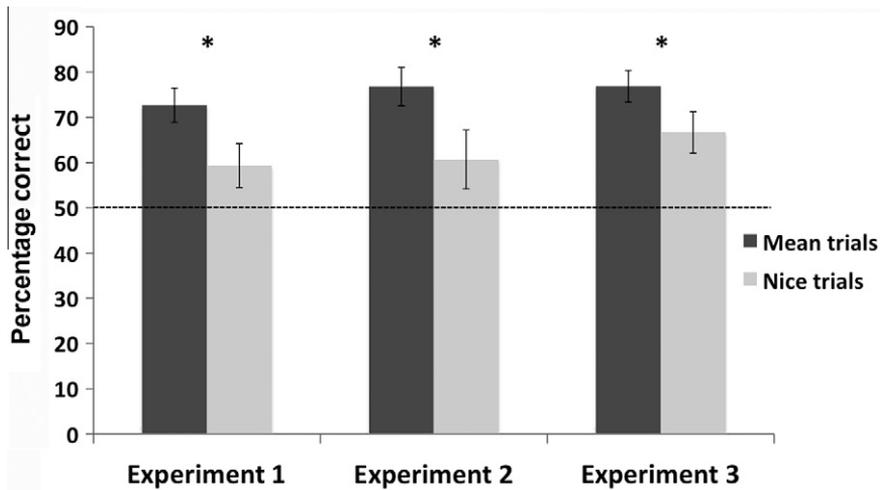
Fig. 1. Memory for "mean" and "nice" events depicted in Experiment 1 (left), Experiment 2 (middle), and Experiment 3 (right). Asterisks indicate $p < .05$. Error bars represent standard errors.

Experiment 1 suggests that children remember negative information over positive information about others. Nevertheless, these results may reflect a biased guessing strategy rather than enhanced memory for threatening individuals per se. When they do not remember a target's actions, children may be more likely to guess "mean" than "nice," resulting in an artificially increased number of correct responses toward mean targets. Research on the positivity offset during early childhood suggests that children are unlikely to adopt this strategy; as a baseline, children expect others to be nice (e.g., Boseovski, 2010). Nevertheless, children may err on the side of caution, assuming that individuals are threatening when they are unsure, especially when some of the individuals presented are mean (see Haselton & Buss, 2003, for a related argument). Experiment 2, therefore, tested children's detailed memory for negative information over positive information more directly by comparing children's memory for the specific actions committed by nice and mean individuals.

Experiment 2

Experiment 2 presented children with the same familiarization phase as in Experiment 1. At test, children were asked to recognize which particular mean or nice action each target had committed. We predicted that children would more accurately remember the specific actions conducted by mean individuals compared with nice individuals.

Method

Participants

A total of 28 4-year-olds (14 boys and 14 girls, mean age = 52.5 months, range = 48.5–60.0) participated in this experiment. Participants were predominantly White and lived in middle- to upper middle-class neighborhoods.

Procedure

Participants were familiarized with four nice and four mean individuals, as in Experiment 1. Immediately after familiarization, children were shown the same faces in a new order and were asked to recall the specific behavior associated with each person (e.g., "Did Ashley steal everyone's cookies so no one got any, or did she say mean things to kids and make them cry?"). Test questions consisted of either two "nice" facts or two "mean" facts, both of which had been presented during familiarization; the order of questions was counterbalanced across participants.

Results and discussion

Overall, children were above chance at remembering the specific behaviors associated with different individuals (chance = 50%, $M_{\text{all trials}}$ = 68.75%, *SE* = 4.75), $t(27)$ = 3.95, $p < .001$, d = 0.75. Critically, children displayed greater accuracy when selecting mean actions than when selecting nice actions ($M_{\text{mean trials}}$ = 76.79%, *SE* = 4.25, $M_{\text{nice trials}}$ = 60.71%, *SE* = 6.48), $t(27)$ = 2.93, p = .007, d = 0.55 (see Fig. 1, middle).

In Experiment 2, children again demonstrated enhanced memory for mean individuals compared with nice individuals. This finding cannot be explained by a biased guessing strategy in which children preferentially guess "mean" when they do not remember a target's actions. In Experiment 2, children displayed heightened accuracy when recognizing which of two mean actions a mean individual had performed compared with when recognizing which of two nice actions a nice individual had performed. Thus, beyond simply tagging individuals as "mean" or "nice," children demonstrate a negativity bias in their memory for an individual's specific actions.

Children's enhanced memory for threatening social actions could operate in a number of ways. One possibility is that children's negativity bias is limited exclusively to information that is useful for tracking threatening individuals. Children may show heightened memory for mean individuals, including both their faces (Kinzler & Shutts, 2008) and their actions (Experiment 2). However, children might not show a similar memory bias for individuals associated with negative social acts who are themselves nonthreatening. Supporting this hypothesis, Kinzler and Shutts (2008) found no evidence for a face memory advantage for "sad" versus "happy" recipients of the same mean and nice actions. Thus, a memory bias for threatening social information may be limited to memory for individuals who acted in threatening ways. Such a mechanism would be sufficient to help children avoid these individuals in future interactions.

Alternatively, although children might not always exhibit enhanced face memory for individuals who were the recipients of negative actions, they may nevertheless encode the details of the threatening situations that befell those individuals. Such a bias might help children to avoid potentially threatening situations even when information about the perpetrator is unavailable. For example, after learning that a classmate had been pushed on the playground by another child, children may subsequently be more observant on the playground even without knowledge of the particular perpetrator's identity. Experiment 3 investigated whether children show similar memory advantages for negative versus positive social actions when the actions are described from the perspective of the recipient rather than from the perspective of the perpetrator.

Experiment 3

Participants viewed the same faces presented in Experiments 1 and 2. However, in Experiment 3 each face was described as the recipient of the same "nice" or "mean" actions presented in Experiments 1 and 2. We assessed whether children preferentially remembered the negative versus positive social actions when they learned about the recipients rather than the perpetrators of these actions.

Method

Participants

A total of 27 4-year-olds (12 boys and 15 girls, mean age = 53.2 months, range = 47.0–59.0) participated in this experiment. Participants were predominantly White and lived in middle- to upper middle-class neighborhoods.

Materials and procedure

Participants were presented with the same stimuli used in Experiments 1 and 2 with the exception that the nice and mean actions paired with each face were described from the perspective of the recipients of the actions rather than from the perspective of the actors. Thus, participants were familiarized with four "happy" individuals and four "sad" individuals who were described as the

recipients of the positive and negative actions (e.g., "Ashley is always sad. Today her cookies were stolen and she didn't get any") (see Appendix B for a full list of facts presented). Immediately after familiarization, children were shown the same faces in a new order and were asked to recall the specific information associated with each person. Test questions consisted of either two positive events or two negative events, both of which had been presented during familiarization (e.g., "Were Ashley's cookies stolen so she didn't get any, or did someone say mean things to her and make her cry?"). The order of test questions was counterbalanced across participants.

Because information about threat may elicit processing advantages over general negativity (e.g., LoBue, 2009), and because Kinzler and Shutts (2008) did not observe a face memory advantage for individuals presented as "sad" versus "happy," we speculated that a memory advantage for sad individuals over happy individuals may be more difficult to detect compared with the memory advantage we find for mean individuals over nice individuals. Thus, to increase power, we doubled the number of test trials presented. After the first familiarization and test, the procedure was repeated an additional time so that participants learned about, and were asked about, each individual a total of two times.

Results and discussion

Overall, children were above chance at remembering the specific behaviors associated with different individuals (chance = 50%, $M_{\text{all trials}}$ = 71.3%, SE = 3.43), $t(26)$ = 6.22, $p < .001$, $d = 1.20$. A 2 (Event Valence: negative or positive) × 2 (Test Phase: first or second) repeated-measures analysis of variance (ANOVA) revealed a significant main effect of event valence, $F(1,26)$ = 5.42, $p = .03$. Children displayed greater accuracy when selecting "mean" events than when selecting "nice" events ($M_{\text{mean trials}}$ = 76.85%, SE = 3.51), $M_{\text{nice trials}}$ = 66.67%, SE = 4.57), $t(26)$ = 2.33, $p = .03$, $d = 0.46$ (see Fig. 1, right). There were no other significant main effects or interactions, $Fs(1,26) < 0.11$, $ps > .75$.

Experiment 3 replicated and extended the findings of Experiment 2. Children displayed a memory advantage for the same negative versus positive actions presented in Experiments 1 and 2 even when they learned about the actions from the point of view of their recipients. Thus, children appear to show heightened memory for the details of negative or threatening actions regardless of whether those details are associated with the perpetrators of those actions (as in Experiments 1 and 2) or with the victims of those actions. The negativity bias during early childhood may aid children in avoiding situations where threatening social actions are likely to occur even when information about the identity of the perpetrator is unavailable.

General discussion

The current experiments provide evidence that children show detailed memory for negative social information. Across three experiments, 4-year-old children were presented with vignettes describing positive and negative social actions. In Experiment 1, children correctly identified threatening individuals as "mean" more often than they correctly identified prosocial individuals as "nice." In Experiment 2, children more accurately remembered the specific actions committed by mean individuals compared with nice individuals. Experiment 3 revealed a similar advantage in children's memory for the details of negative actions even when they were presented from the perspective of the recipients of those acts. Our findings suggest that starting at least as early as preschool, a negativity bias appears to facilitate memory for a variety of detailed social information relevant for avoiding both threatening individuals and potentially harmful situations. Thus, the negativity bias in children's memory for threatening actors extends beyond a mechanism that is useful solely for tracking threatening individuals (Kinzler & Shutts, 2008). Instead, children show heightened memory for the details of threatening social actions more generally. This more sophisticated mechanism could allow children to monitor social threat in nuanced ways.

One alternative interpretation of our findings is that rather than showing a memory bias for the details of threatening social actions per se, experiencing threatening information may simply make children more vigilant or encourage them to attend more closely to any information (regardless of

its threat relevance) that is presented along with or shortly after a vignette about a mean individual's actions. Although this is an interesting possibility, past research suggests that arousal does not enhance memory for any and all co-occurring stimuli. For example, adults show *decreased* memory for faces presented in a negative arousing background context (Rainis, 2001). Moreover, as discussed further below, Kinzler and Shutts (2008) found no evidence that children show increased memory for the faces of the recipients of mean versus nice social actions. Thus, it is unlikely that children remember *any* information paired with negative information; rather, children may selectively remember information that is relevant for avoiding harmful situations (see Kensinger, 2007, for a similar argument). Nonetheless, future research could investigate whether threatening or arousing information facilitates children's memory for information that is not threat relevant.

Additional open questions concern the role of threat-relevant information specifically versus negativity more generally in eliciting negativity biases such as those demonstrated in the current experiments. The threatening social actions presented here were both negatively valenced and threat relevant; thus, children's preferential memory for mean actions may have been driven either by the fact that they were threat relevant or by the fact that they were negatively valenced. Because detecting and avoiding threat is particularly important for survival, threatening social actions may elicit a particularly strong negativity bias compared with information that is negative yet threat-irrelevant (e.g., LoBue, 2009). Future research might investigate whether the negativity bias identified in the current research extends to negative, yet threat-irrelevant, social information (e.g., "Kyle lost his favorite toy today").

The findings presented here suggest that children remember threat-relevant social information even when it is associated with a nonthreatening individual. In contrast, Kinzler and Shutts (2008) found that although children displayed enhanced face memory for mean individuals versus nice individuals, children did not show a face memory advantage for the sad versus happy recipients of the same actions. One explanation for this discrepancy between previous findings and the current findings is that memory advantages for victims, who are associated with negativity but are themselves nonthreatening, may be weaker and more difficult to detect compared with memory advantages for threatening individuals. Thus, past research demonstrating children's preferential memory for mean individuals may have failed to detect a similar but less robust memory advantage for sad individuals. Research on face perception provides some support for the possibility that processing advantages for negative, yet nonthreatening individuals are weaker than similar processing advantages for threatening individuals: children exhibit a general processing advantage for negative facial expressions compared with neutral or positive expressions. This negativity bias has been observed for facial expressions that are both threat relevant (e.g., anger, fear) and threat irrelevant (e.g., sadness). However, children also display a particularly pronounced processing advantage for facial expressions that are both negative and threat relevant (e.g., anger, fear) over and above negative threat-irrelevant expressions (e.g., sadness) (LoBue, 2009). Increasing the difficulty of our current method by imposing a delay between familiarization and test, or by using an open-ended recall measure instead of a forced-choice test, may allow us to detect whether children's memory advantage for mean perpetrators is stronger or more robust than their memory advantage for sad victims.

Another possible explanation for the discrepancy between our findings and those of Kinzler and Shutts (2008) is that preferential memory for sad individuals over happy individuals may emerge only in situations where it is particularly beneficial for avoiding harmful situations. Preferential memory for sad individuals over happy individuals may fail to emerge in a face memory task because remembering the identity of a victim is not particularly helpful for avoiding future harm. In contrast, children may preferentially remember the details of negative social actions associated with a victim because remembering these details may help children to avoid similarly harmful situations (e.g., "Playgrounds can be dangerous"). Future research should more thoroughly examine the interplay between threat-specific and negativity-general processing advantages during early childhood.

Finally, future research might identify the ways in which negativity biases in children's memory influence children's behavior in real-world contexts. Children may retain and use their memory for negative details to predict and avoid future negative encounters. For example, learning that an individual committed an antisocial act may cause children to selectively avoid interacting with that individual in the future. After learning about the victim of a threatening social action, children may

selectively avoid situations where similar threatening events may take place. These and other studies of the negativity bias during early childhood can shed further light on the mechanisms by which children remember and use information about others when navigating their social world.

Acknowledgments

Appendix A

Positive and negative facts paired with faces in Experiments 1 and 2

Briana is always mean—today she pushed someone on the playground.
Jessica is always nice—today she helped someone on the playground.
Kevin is always mean—today he stole everyone's cookies and no one got any.
Christopher is always nice—today he brought in cookies and everyone got some.
Kimberly is always mean—today she yelled at kids and made them cry.
Ashley is always nice—today she said nice things to kids and made them smile.
David is always mean—today he broke the other kids' toys and no one could play.
Drew is always nice—today he shared his toys and everyone played.

Appendix B

Positive and negative facts paired with faces in Experiment 3

Christopher is always happy—today he was asked to play on the playground.
Kevin is always sad—today he was pushed on the playground.
Jessica is always happy—today she was given cookies and she ate them.
Briana is always sad—today her cookies were stolen and she didn't get any.
Drew is always happy—today he was told nice things and smiled.
David is always sad—today he was yelled at and he cried.
Ashley is always happy—today she got some toys and played with them.
Kimberly is always sad—today her toys were broken and she couldn't play.

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