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Cry Babies and Pollyannas: Infants Can Detect Unjustified Emotional Reactions

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Infants are attuned to emotional facial and vocal expressions, reacting most prominently when they are exposed to negative expressions. However, it remains unknown if infants can detect whether a person's emotions are justifiable given a particular context. The focus of the current paper was to examine whether infants react the same way to unjustified (e.g., distress following a positive experience) and justified (e.g., distress following a negative experience) emotional reactions. Infants aged 15 and 18 months were shown an actor experiencing negative and positive experiences, with one group exposed to an actor whose emotional reactions were consistently unjustified (i.e., did not match the event), while the other saw an actor whose emotional reactions were justified (i.e., always matched the event). Infants' looking times and empathic reactions were examined. Only 18-month-olds detected the mismatching facial expressions: Those in the unjustified group showed more hypothesis testing (i.e., checking) across events than the justified group. Older infants in the justified group also showed more concerned reactions to negative expressions than those in the unjustified group. The present findings indicate that infants implicitly understand how the emotional valence of experiences is linked to subsequent emotional expressions.

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To function effectively in the social world, children must develop the ability to understand others' behaviors through the attribution of internal states, such as beliefs, intentions, and emotions. The detection and understanding of emotions are particularly important to infants, as others' behaviors can often be predicted and explained through their emotional expressions. By 12 months, infants are able to both categorize and discriminate a variety of emotional expressions (Nelson, 1987; Quinn et al., 2011). With this newly acquired knowledge, infants also begin to use emotional information from others to modify their own behaviors. For example, in the standard social referencing paradigms, 12-month-olds have consistently been shown to approach a novel object when a person displays a positive expression toward the object and avoids it when a negative expression is posed (Hornik, Risenhoover, & Gunnar, 1987; Mumme, Fernald, & Herrera, 1996). Central to the current paper, however, is whether infants can use the emotions expressed by others to infer their future actions and make predictions about how emoters will react to a given situation.

In one of the first studies examining such abilities, Repacholi and Gopnik (1997) presented 14- and 18-month-olds with two food items and assessed which item each infant preferred. Then, the experimenter tasted each food, expressing facial and vocal disgust toward the food item the infant had previously preferred, and happiness toward the item that the infant had previously disliked. The experimenter then asked the infants to give her one of the food items. Only 18-month-olds gave the experimenter what she herself had preferred. Thus, by 18 months of age, infants appear to be able to infer desires from facial and vocal expressions. In a similar study which did not require infants to inhibit their own desires, Repacholi (1998) presented 14- and 18-month-olds with two containers, the contents of which were unknown to the infants. The experimenter opened the lids, looked inside the boxes and expressed happiness toward one and disgust toward the other. When offered the two boxes, both 14- and 18-month-olds were more likely to initially search into the "happy" box, indicating that when they do not have to inhibit their own desires, infants as young as 14 months are able to use both the experimenter's attentional cues and emotional expressions to predict the nature of the referent that is the focus of her attention.

Other studies have considered whether someone's emotional expressions toward objects is interpreted by infants as a cue about that person's object preference. Using a violation of expectation paradigm, Phillips, Wellman, and Spelke (2002) habituated 12- and 14-months-olds to an actor attending to and expressing positive affect toward an object. On the test trials, the actor either held a novel object (inconsistent event) or the previously

"liked" object (consistent event). By 14 months, infants looked longer at the inconsistent event, suggesting that they use gaze and positive emotional expression to predict others' actions. Barna and Legerstee (2005) extended these findings by including both positive and negative emotions in the paradigm and by testing younger infants. Their findings revealed that 9-month-olds are able to use emotions to make predictions about others' subsequent actions on objects. Finally, Hoicka and Wang (2011) recently showed that by 15 months of age, infants can detect a violation when an actor performs an action on an object that does not match her preceding vocal cue.

Challenging the aforementioned findings, Vaish and Woodward (2010) recently attempted to tease apart whether infants were responding to attentional or emotional cues. Adapting Phillips et al.'s (2002) procedure, they included a negative emotion condition, in which the actor expressed disgust or happiness while looking into only one of two cups. They hypothesized that on test trials, infants should look longer when the actress acted in a manner inconsistent with her emotional displays (i.e., look in Cup B when she was previously happy with Cup A and look in Cup A when she was previously disgusted with Cup A). Their findings revealed that 14-month-olds looked longer when the actress reached into the unattended cup, regardless of the emotion she had previously expressed toward the other cup. They concluded that infants' predictions about someone's object preference are based on attentional cues alone at the age of 14 months.

The two previously mentioned studies investigated infants' emotional understanding by assessing whether they understand that people's emotional expressions are reliable cues of their subsequent goal-directed behaviors. However, another important way in which to examine whether infants can understand emotional expressions is by examining whether they can predict the appropriate emotional reactions after witnessing someone who experiences positive or negative events. An extensive literature has shown that infants are very much attuned to emotionally salient events, reacting most prominently when they are exposed to distressing contexts (Vaish, Grossmann, & Woodward, 2008), such as seeing a person in pain after hurting herself (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992). During these events, infants as young as 8 months will show increasingly observable nonverbal empathic responses, such as concern, hypothesis testing (i.e., deciphering what occurred to the actor), and social referencing (Roth-Hanania, Davidov, & Zahn-Waxler, 2011; Zahn-Waxler et al., 1992) and later engage in more prosocial behaviors, such as helping and comforting the distressed individual, as early as 14 months of age (Dunfield, Kuhlmeier, O'Connell, & Kelley, 2011;

Svetlova, Nichols, & Brownell, 2010; Warneken & Tomasello, 2007). Interestingly, one study has demonstrated that 18-month-olds are also more likely to show concerned looks and more prosocial behaviors toward a victim who has lost an object in the absence of any emotionally distressing cues by that victim (Vaish, Carpenter, & Tomasello, 2009). These last results suggest that infants are more responsive to the valence of events than to the valence of emotional expressions.

While infants react to distressing events with or without emotional cues, it remains unknown if infants can detect whether a person's emotions are justifiable given a particular context. That is, can infants detect when a person's emotional expressions do not match the emotions that are expected following a person's experience? Examining infants' responses to a mismatch between an actor's display of emotion and the valence of the event would allow for a new way to examine whether infants detect the meaning of others' emotions in context; That is, whether infants' reactions are being driven by the context of that emotion, or simply reacting solely to emotional expressions, without placing them in context. To date, only one study has addressed this question. Hepach, Vaish, and Tomasello (2012) examined whether 3-year-olds would show concern toward an actor displaying distress after one of three conditions: after the actor received substantial-harm (e.g., catching his finger in the lid of a box), minor-harm (e.g., catching his sleeve in the lid), or no-visible-harm (showing distress "out of the blue"). Children in the substantial-harm condition showed more concern than those in the no-visible-harm condition, but not in the minor-harm condition. Similarly, the researchers examined children's checking behaviors (i.e., looking to see what happened to the actor, assessment of the situation) in all three conditions and found that children engaged in more checking behaviors in the no-visible-harm than in the substantial-harm condition. Thus, these findings showed that preschoolers are sensitive to the appropriateness of the distress given the context.

While the study by Hepach and colleagues shows that preschoolers can detect whether distress is unjustified in a given context through their empathic responses, it remains unknown whether infants will detect when emotional distress is unjustified versus when it is justified. Furthermore, no research has examined whether infants (or older children) react differently when happiness is justified or unjustified. Thus, the main objective of the current paper was to examine whether *infants* would display an experience–emotion causal understanding, through their looking time and empathic behavioral responses. That is, will infants respond the same way to "crybabies" and "pollyannas" (i.e., a person whose emotional expression is unjustified) as to a person whose emotional reaction is justified? Furthermore, will infants' empathic responses demonstrate that they can

detect the incongruity of someone's negative emotional reaction following a positive experience? Negative and positive experiences that infants would be familiar with were selected, such as having an object stolen and hurting one's finger. Infants as young as 5 months consider that stealing an object is a negative behavior (Hamlin, Wynn, Bloom, & Mahajan, 2011), and by 8 months, infants show empathy to someone who is hurt (Roth-Hanania et al., 2011). To provide more extended findings, a positive event condition, in which the infant saw a person obtaining a desired object, was also included. Two groups of infants were shown an actor experiencing distressing and positive events, with one group exposed to an actor whose emotional reaction was consistently unjustified (i.e., did not match the event), while the other group saw an actor whose emotional reactions were justified (i.e., always matched the event). It was hypothesized that if infants understand which emotional expressions are associated with each type of event, then (1) the unjustified group would engage in more hypothesis testing than the justified group across all events; (2) the justified group would display more concern for the actor during the negative events (as her emotional reactions were appropriate) than the unjustified group; and (3) both groups of infants would show equal levels of concern during the positive events. The second objective was to examine the age at which infants develop the ability to detect mismatching experience–emotion associations. Given that past research on the understanding of emotions in infants has shown a developmental change during the second year, the design included both 15-month-olds and 18-month-olds.

METHOD

Participants

Forty-five 15-month-olds (M = 15.31, SD = 0.65, range = 14.27–16.90) and 53 18-month-olds (M = 18.45, SD = 0.25, range = 18.07–18.96) participated in this study (39 females, 53 males). Of the 15-month-olds, one child was excluded due to experimental error, leaving a final sample of 44 infants (unjustified = 21, justified = 23). Of the 18-month-olds, five were excluded due to experimental error, leaving a final sample of 48 infants (unjustified = 24, justified = 24).

Materials

An apparatus resembling a puppet theater was used to display the experimenter (E1) acting out four events (spoon, pegs, drum, and ball) live in front of the infants. Infants observed E1 from a child seat placed 90 cm

from the display. The events included the following materials: a plastic orange food bowl and a plastic purple spoon, a yellow and orange plastic drum with a yellow drum stick, a colorful wooden peg and hammer set, and a colorful ball. Above E1's head was a camcorder focused on the infants' face to record their looking times and behaviors.

Stimuli and procedure

Parents initially signed consent forms and were then invited with their infants into the testing room. Infants were seated in a child's seat attached to a table, and parents were asked to sit behind and to the left of the infant. They were instructed to remain neutral and keep their eyes on E1 so as to maintain the infants' attention on the display. Between trials, a screen (controlled by E2) was lowered, a small bell was rung to attract the infants' attention toward the stage, and then, E2 raised the screen to begin the next trial.

During each trial, infants saw E1 on the left side of the stage. Each trial lasted 20 sec and included two phases: a familiarization phase during which the infant saw E1 interacting with the toys, with E1 positioned slightly angled toward the toys (5 sec) followed by a positive or negative event experienced by E1 (5 sec), and E1 expressing the target emotion (happiness, sadness, or pain, based on Ekman, Friesen, & Ellsworth's guidelines, 1972) while looking downwards (10 sec) without any vocalizations or movements. E1 looked downwards as to not attract the infants' attention to her face and eyes, as well as to reduce distress for the infants during the negative facial expressions. Each infant saw all four events, which included two positive events (E1 received objects) and two negative events (an object was taken away from E1 or E1 pretending to hurt herself). Positive and negative events alternated across the four trials, and the order of the trials was counterbalanced across participants.

The two positive events included play-drum and play-ball. During the play-drum trial, the infant watched as E1 pretended to beat a toy drum with an invisible drumstick. Her face was neutral and gazed at the drum set. Then E2's gloved hand entered from the right side of the stage and handed E1 the drumstick. E1 then exclaimed "Ah!" while remaining neutral, froze with her hand above the drum set, turned her head toward the infant (gazing downwards), and showed either a happy (justified) or sad (unjustified) facial expression without vocalizations (see Figure 1). During the play-ball trial, infants watched as E1 moved her empty cupped left hand up and down while expressing no emotion. E2's gloved hand then emerged and handed E1 a ball, at which point E1 exclaimed "Ah!" while remaining neutral, froze her hand holding the ball, turned her head

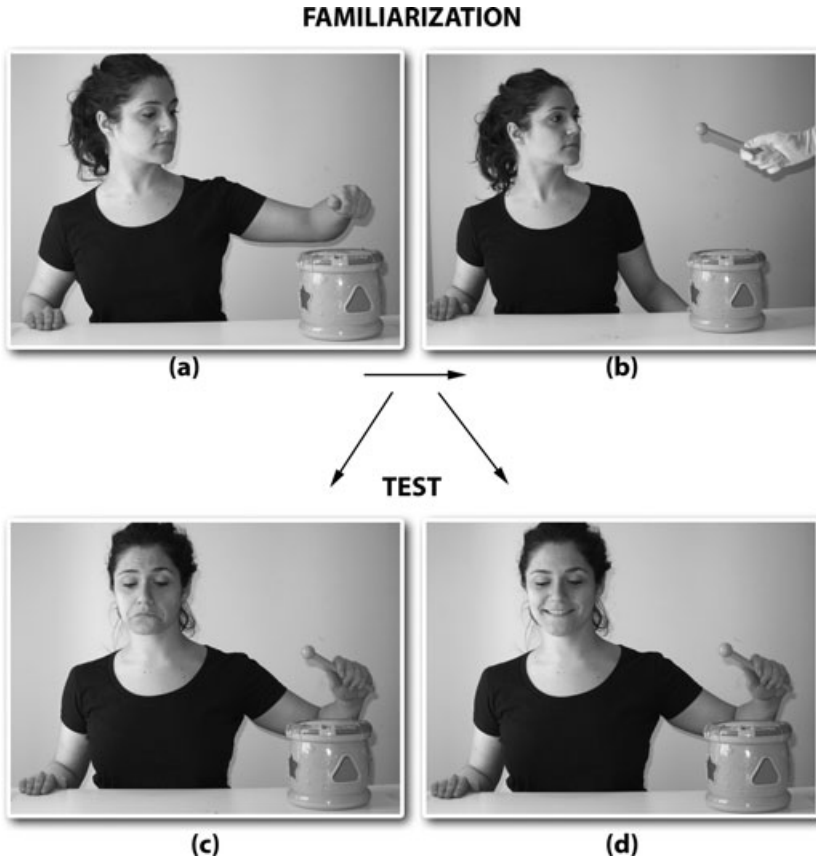

Figure 1 Events shown during the play-drum trial. During the familiarization phase, (a) the actor pretended to hit the drum with a drumstick then (b) E2 hands the actor the drumstick and the actor expressed "Ah!" before taking the drumstick. During the test phase, the unjustified group saw the actor express sadness for 10 sec (c) while the justified group saw the actor express happiness for 10 sec (d).

toward the infant (gazing downwards), and froze with an expression of happiness (justified) or pain (unjustified) without vocalizations.

The two negative events included object-loss (spoon) and hurt-finger (pegs). During the object-loss trial, E1 dunked her spoon into a food bowl and brought the spoon to her mouth twice. During the third dunk, E2's gloved hand entered and took away E1's spoon. While remaining neutral and freezing her hand above the bowl, E1 exclaimed "Oh!", turned her head toward the infant (gazing downwards), and expressed either sadness

(justified) or happiness (unjustified) without vocalizations. Finally, during the hurt-finger trial, E1 pretended to hammer a peg while holding the hammer in her right hand and a peg in her left hand. E1 then pretended to hit her left thumb, exclaimed "Ouch!" while remaining neutral, held her left thumb, turned her head toward the infant (gazing downwards), and expressed either pain (justified) or happiness (unjustified) without vocalizations.

Coding and reliability

Infants' empathic behaviors were coded based on the coding scheme developed by Zahn-Waxler et al. (1992) with adaptations to account for the context and age of the infants. Two codes for the infants' empathic-related responses were used for the purposes of this study: Concern for victim and hypothesis testing. Concern for victim was coded on a 3-point scale : 0 = none; 1 = facial concern only (e.g., furrowed or raised eyebrows in concern, open mouth, widened eyes); 2 = facial concern with vocalizations (e.g., same as 1, but with vocalizations such as "Oh!" or calling to the parent in the room with concern or pointing to the actor). Hypothesis testing was coded on a 4-point scale: 0 = none; 1 = looks back and forth between face and object or hands at least twice, in an attempt to decipher the distress; 2 = looks back and forth between face and object or hands more than twice in a more sophisticated attempt to decipher the distress than 1; 3 = looks back and forth between face and object at least twice, with a back and forth look toward the parent in the room OR looks back and forth between parent and the actor at least twice, in a sophisticated attempt to decipher the distress. Looking behaviors, which have consistently been considered a primary variable for hypothesis testing as a sign of very young children's attempts to attribute cause (Hepach et al., 2012; Knafo, Zahn-Waxler, Robinson, & Rhee, 2008; Zahn-Waxler et al., 1992), were extended as a primary code for hypothesis testing due to infants' limited verbal abilities. Infants' total looking times at the stage, which included the actor's face and hand, during the familiarization phase (i.e., when the event occurred) and the test trials (i.e., when the actor was expressing the target emotion), were also coded for each trial. Infants' looking times were coded using INTERACT 8.0 (Mangold, 2010).

Each participant's responses were coded by the primary investigator. To keep the investigator blind to the hypotheses, all looking times for the entire sample were coded first, which allowed each event to be divided into the familiarization and test trials. Then, the investigator coded the 10 sec test trial which did not include the "Oh!" or the "Ah!" vocalization of the familiarization phase (and thus the scene and condition remained blind to

the coder). To establish intercoder reliability, 35% of the sample ($n = 33$) was coded by a second independent observer who was blind to the hypotheses and the condition. The kappas for the concern variable were $\kappa = 1.00$ for the negative events and $\kappa = .90$ for the positive events, while the hypothesis testing variable kappas were $\kappa = 1.00$ for the negative events and $\kappa = .98$ for the positive events. Pearson correlations were calculated to determine the inter-rater agreement for the looking times measures. The inter-rater agreement for looking times at the face was $r = 0.97$ during the negative events and $r = 0.96$ during the positive events. The two coders also showed high agreement for looking times at objects-hand, with $r = 0.92$ for the negative events and $r = 0.95$ for the positive events, all highly significant ($ps < .001$).

RESULTS

Infants' scores on the play-drum and play-ball trials (positive events) were correlated for both concern ($r = 0.48$, $p < .01$) and hypothesis testing ($r = 0.28$, $p < .01$), and thus, averaged to create two separate variables: *Concern during positive events*; and *hypothesis testing during positive events*. Similar variables were created for the negative events, as the objects-loss and hurt-finger trials were correlated for concern ($r = 0.50$, $p < .001$) and hypothesis testing ($r = 0.47$, $p < .001$). Preliminary analyses revealed that the concern variable for the positive and negative events was positively skewed. Therefore, an additive (+1) transformation was conducted on the two concern variables (*concern during positive events* and *concern during negative events*) (added 1 to every data point) and was used for the remaining analyses. Independent-samples t tests revealed that gender was unrelated to all of the outcome measures (range $t = -0.854$–1.53, $p = .13$–$.82$) so gender was not considered in the analyses.

To examine whether infants were attending to the scene during the familiarization phase, infants' total looking time at the scene (i.e., looking at the face, objects-hand) was calculated in an Age (15 and 18 months) × Condition (justified/unjustified) ANOVA. No significant differences emerged, in that infants in both conditions and across both age groups, looked at the scene during the familiarization trials the same high amount of time out of 10 sec ($M = 9.45$ sec, $SD = .50$ sec and $M = 9.43$ sec $SD = .80$ sec, ns., for justified and unjustified conditions, respectively). During the test trials, infants' looking times at the scene were divided into their looking times at the actor's face and at objects-hand and were analyzed using an Age × Condition (justified/unjustified) × Area (face/objects-hand) mixed ANOVA. A significant main effect of

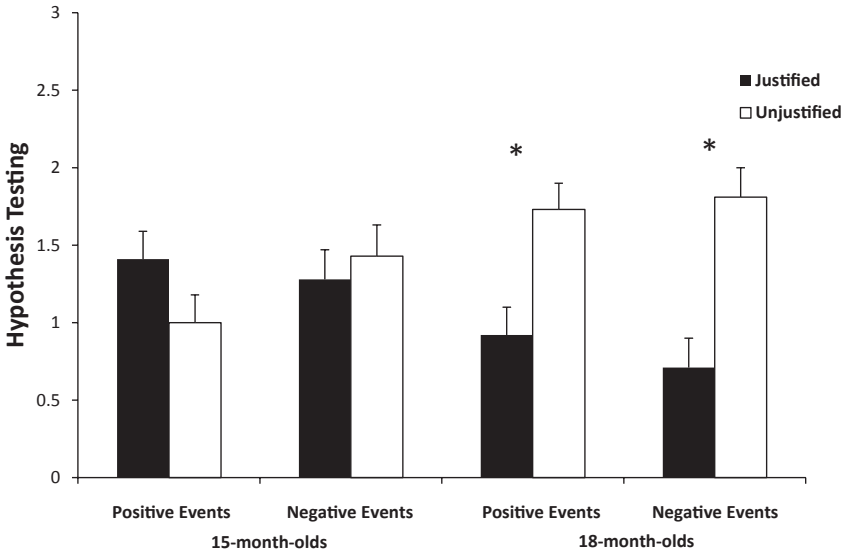

Figure 2 Mean hypothesis testing scores for the justified and unjustified groups as a function of type of event for each age group.

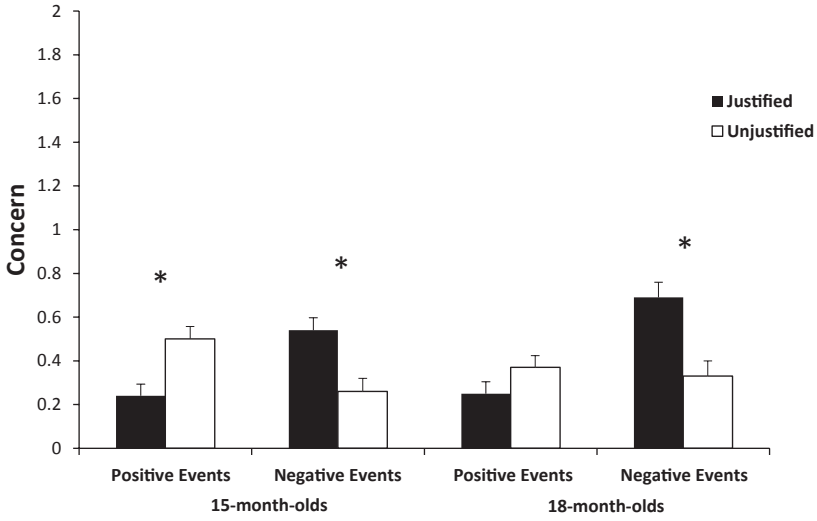

Figure 3 Mean concern scores for justified and unjustified groups as a function of type of event for each age group.

area emerged (F (1,88) = 48.48, $p < .001$, $\eta^2 = .36$). Overall, infants looked at the actor's face more than at the objects-hand (face: $M = 5.10$ sec, $SD = 1.33$ sec, objects-hand: $M = 3.43$ sec, $SD = 1.23$ sec, $p < .001$). Results also revealed a trend for a three-way interaction, F (1,88) = 3.58, $p = .06$, $\eta^2 = .04$). Older infants in the unjustified condition looked at the objects-hand more than those in the justified condition (unjustified: $M = 3.86$ sec $SD = 1.35$ sec, justified: $M = 3.16$ sec $SD = 1.43$ sec, $p = .05$), but no difference emerged in looking times at the face (unjustified: $M = 4.88$ sec $SD = 1.5$ sec, justified: $M = 5.51$ sec $SD = 1.40$ sec, ns.). No such differences were observed in the younger group.

Given the nonparametric nature of the hypothesis testing and concern variables, Mann–Whitey U-tests were used to analyze the effects of condition for the positive and negative events for both age groups separately. For the 15-month-olds, infants in the justified and unjustified conditions showed similar levels of hypothesis testing during the negative events ($U = 227.5$, ns.). Similarly, no significant differences were found between the justified and unjustified groups' levels of hypothesis testing during positive events ($U = 227.5$, ns.). In contrast, at 18 months, the findings revealed that the unjustified group showed more hypothesis testing during the negative events ($U = 105$ $p < .001$) than the justified group. Likewise, the unjustified group showed more hypothesis testing during the positive events ($U = 139$ $p = .002$) than the justified group (see Figure 2).

With regard to the concern variables, results revealed that 15-month-old infants in the justified condition showed more concern during the negative events than those in the unjustified condition ($U = 152.5$ $p = .025$), while the unjustified group showed more concern during the positive events than the justified group ($U = 157.5$ $p = .033$). For the 18-month-olds, results showed that the justified group showed more concern during the negative events than those in the unjustified condition ($U = 175.5$ $p = .013$). However, the reverse was not true: Infants in the unjustified group did not show more concern during the positive events than the justified group ($U = 241.5$, ns.; see Figure 3).

DISCUSSION

This study examined infants' emotion understanding by investigating whether they recognize inconsistencies between emotional displays and the valence of events in which a person has been involved, providing two important contributions to the literature. First, our findings provide new insight on the development of theory of mind during the infancy period

(Poulin-Dubois, Brooker, & Chow, 2009; Sodian, 2010). More specifically, a developmental progression was observed in infants' abilities to link emotional expressions typically associated with emotion-inducing events. While 15-month-old infants did not engage in more hypothesis testing when the emotion did not match the context, older infants in the unjustified group displayed more hypothesis testing than those in the justified group, regardless of whether the event was positive or negative, supporting our first hypothesis only for the older infants. These findings were also confirmed through the analyses of looking times. Younger infants in both conditions did not differ at what aspects of the scene they were looking at during the test trials. However, although 18-month-olds in both conditions looked at the face a similar amount of time, it was only those in the unjustified condition who looked more often at the source of the emotional display (i.e., objects and the actor's hand).

Notably, to detect inconsistencies between facial expressions and experiences, infants must have some implicit understanding of the underlying emotional states that are associated with experiences such as losing or receiving an object. While infants change their behavioral responses when someone shows signs of pain (Hamlin et al., 2011; Roth-Hanania et al., 2011) or modify their behavior following someone's facial expression (Hornik et al., 1987; Mumme et al., 1996), the understanding of the link between a facial expression following an emotional experience, that is, understanding the appropriateness of that emotion, is an ability that has yet to develop at 15 months. The developmental pattern observed in the current study is in accord with previous (limited) research that has shown developmental changes in infants' processing of emotional expressions with regard to an occurring event around the middle of the second year (Repacholi, 1998; Repacholi & Gopnik, 1997; Vaish & Woodward, 2010). The current findings are also consistent with those of Hepach et al. (2012) with preschoolers, showing that when individuals' emotional reactions are inconsistent with the context, 18-month-old infants will also check back and forth between the actor and the source of distress in what seems to be an attempt to try to "figure out" what happened. Our study provides the first evidence that as early as 18 months infants respond differently to others' emotional reactions depending on the credibility of that distress with respect to the context.

Our findings diverge with those from Phillips et al. (2002) and Barna and Legerstee (2005), who showed that 9- to 14-month-old infants can encode an emoter's desires toward an object and predict whether they will further act on that object. However, an important methodological discrepancy must be noted between the current study and the two aforementioned ones: The fact that infants never observed the actor directly act

on the object in both Phillips et al. (2002) and Barna and Legerstee's (2005) studies and yet looked longer when the emotion-action sequence was inconsistent renders the interpretations as only indirect evidence for infants' emotion understanding. In fact, another way the results could be explained in both studies is by the type of associative learning mechanisms suggested by several researchers (e.g. Csibra, 2003; Perner & Ruffman, 2005; see Paulus, 2011: for a discussion). Indeed, Vaish and Woodward (2010) provided evidence that it is attentional cues and not emotional cues that drive 14-month-old infants' reactions to an actor's unexpected object choice. The current study provides more substantial direct evidence as the infants watched a live presentation of an actor undergoing an emotional experience followed by an emotional expression, rendering the findings more generalizable to everyday experiences.

The second contribution of the current paper concerns the development of empathy during the second year of life. Our findings demonstrate that as early as 15 months, infants react with more concern when an actor displays pain or sadness rather than happiness after being hurt or having an object taken away. However, when the same negative facial expressions followed positive events (unjustified condition), infants of that age continued to react with concern to the negative face and ignored the mismatch between the event experienced by the emoter and her emotional expression. Thus, regardless of condition and event, younger infants showed more concern in the presence of the actor's negative expression even when triggered by a positive experience. In addition to supporting the past literature on the negativity bias in young children (see Vaish et al., 2008 for a review), these findings are also consistent with the literature on empathy development in infancy, demonstrating that young infants will react with concern when watching someone in pain (Roth-Hanania et al., 2011; Zahn-Waxler et al., 1992). More importantly, however, the current findings suggest that 15-month-olds' responses to negative emotional expressions are driven by bottom-up processes, as they focus on the emoter's face rather than on the emotional valence of the event at this age. In contrast, 18-month-old infants' behaviors are also guided by a top-down strategy with respect to their responses of concern, as they take into account the appropriateness of the emoter's expressive response given the valence of her recent experience. While infants in the justified condition showed more concern during the negative events than those in unjustified group, they did not show more concern during the positive events, supporting our second and third hypotheses. These findings are in line with those from Hepach et al. (2012) with preschoolers, proposing that similar to 3-year-olds, 18-month-olds can also take into consideration the event

that generated the emotional display, rather than simply react to the actor's face.

In sum, our study is the first to examine infants' reactions to a mismatch between the positive and negative valence of people's experiences and their subsequent emotional reactions to these experiences. The present design is a new way to investigate infants' complex understanding of how emotional valence of events is associated with subsequent behaviors. Future studies should extrapolate from these findings and examine whether infants who are exposed to unreliable individuals in the emotional domain will be affected in their willingness to help or learn from that individual. Recent research has shown that the reliability of an actor's emotional referencing affects infants' gaze following, imitation, and attribution of beliefs to that actor as early as 14 months of age (Chow, Poulin-Dubois, & Lewis, 2008; Poulin-Dubois, Brooker, & Polonia, 2011; Poulin-Dubois & Chow, 2009). However, in these emotional referencing situations, infants only needed to react to a violation of their expectations (finding a toy) but did not need to assess the congruence between the valence of the person's experiences and the valence of that same person's emotional reactions. While it has been shown that preschoolers are more likely to act prosocially toward reliable individuals (Hepach et al., 2012), the impact of an emoter's reliability on young infants' later willingness to help that emoter remains unknown. Thus, future studies can use the present paradigm to examine how infants' experience with reliable or unreliable individuals in the emotional domain impacts their subsequent prosocial behaviors, as well as their attribution of intentions, desires, and beliefs.

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