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Labeling and Describing Discrete Emotions in Early Childhood: A Relational Approach

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Abstract

Emotion understanding involves appreciating the significance of the relational context; the “aboutness” of the emotion. This study examined how children labeled emotions and described relational elements of discrete emotion contexts. Preschool children (3.5-year-olds, $n = 22$; 4.5-year-olds, $n = 23$) described images of 5 emotion contexts (anger, sadness, disgust, fear, and joy). Researchers assessed children’s (1) correct labeling of discrete emotions, and (2) differential mentioning of the emoter (person displaying the emotion) and the referent (the elicitor of the emotion) across discrete emotions. Children’s pattern of accurately labeling discrete emotions was similar to prior research, with both age groups correctly labeling anger, sadness, and joy more often than disgust or fear. Novel to the present study, we found that older children differentially highlighted emotional elements (i.e., the emoter, the referent) when describing discrete emotion contexts. Specifically, 4.5-year-olds emphasized the emoter more when describing anger, sadness, and joy than fear and disgust contexts, and mentioned the referent more in disgust, fear, and joy than anger and sadness contexts. Differential emphasis of relational elements was not observed for 3.5-year-olds. These findings highlight the importance of examining children’s appreciation of relational contexts and indicate important differences in how children differentially emphasize relational elements when viewing discrete emotion contexts. Potential developmental mechanisms, opportunities for further empirical research, and implications for emotion theory are discussed.

Keywords Development · Emotion understanding · Emotional contexts · Facial expressions

A crucial aspect of emotion understanding is appreciating the relational aboutness of the emotional context. As such, individuals must recognize and understand the elements of the emotional context, such as the emotional communication, eliciting object or situation, and likely responses given relation between the two. For example, seeing a child crying while staring at a fallen ice-cream, one would infer that the child is sad *about* losing their treat. While substantial research has investigated children’s labeling of emotion faces, much less has considered how children appreciate the relational contexts within which emotions occur. This study addressed this gap by examining how children label and talk about distinct elements of emotional contexts.

Emotion Understanding in Young Children

Canonical approaches to studying emotion understanding assess when children label discrete emotions — typically facial expressions. From a relational view of emotion, however, such research falls short of ascertaining children’s appreciation of discrete emotions. Specifically, it is insufficient to label an emotion; rather, an observer must understand the relational “aboutness” of the emotion (Deonna & Teroni, 2012; Gordon, 1974). Examining how children utilize relational contexts of emotion can shed unique light on their emotion understanding.

The Role of Context for Labeling Emotions

Emotion differentiation and labeling has been studied extensively in developmental psychology (e.g., Camras & Allison, 1985; Widen & Russell, 2003, 2008, 2010a, 2010b). Children’s emotion labeling emerges systematically over the first 5 years (see Widen & Russell, 2008),

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initially including “happy” more than other labels and then gradually adding anger and sadness, followed by fear and surprise, and lastly disgust (e.g., Widen, 2013). This sequential unfolding of emotion labels has been observed across a variety of face labeling and sorting tasks (e.g., Widen & Russell, 2003, 2008, 2010a, 2010b).

Studying emotion labeling within relational contexts provides further insight of early emotion understanding. Indeed, preschoolers’ emotion labeling is influenced by the context, such as hearing a corresponding emotion story (e.g., Camras & Allison, 1985; Denham et al., 1994; Dunn & Hughes, 1998), and their accuracy improves when particular emotions, specifically fear, compassion, embarrassment, disgust, and shame, are described in stories rather than presented solely as facial expressions (Wang et al., 2014; Widen & Russell, 2010b). For example, Leitzke and Pollak (2016) found that 4-year-olds more accurately identified images of disgust facial expressions presented in context (i.e., body holding a dirty object) than the face alone, but this pattern did not hold for anger. Thus, while presenting children with relational contexts may improve emotion labeling, a systematic study of labeling emotional contexts is lacking in the literature.

Attention to Relational Elements in Emotion Contexts

Beyond labeling emotional states, understanding others’ emotions involves appreciating the relational significance between the individual and their environment (Walle, Reschke, Camras et al., 2017; Walle, Reschke, & Knothe, 2017). For example, labeling someone’s facial expression as fear falls short of appreciating that the person’s fear is *in relation to* an approaching tarantula. Indeed, preschoolers articulate an understanding of emotion-eliciting situations when describing others’ emotions (e.g., Strayer, 1986). From a relational perspective, differential attentional deployment to distinct aspects of the context depending on the communicated emotion is crucial for adaptive functioning (e.g., avoiding a fear-inducing stimulus rather than the fearful person).

A study by Knothe and Walle (2018) examined parents’ emphasis of the emoter and referent when describing emotional contexts to their child. Parents talked about the *emoter* more for anger and sadness images than those depicting disgust and fear, and emphasized the *referent* more for disgust, fear, and joy images than anger and sadness images. College students similarly highlighted the emoter and referent when describing discrete emotion contexts (Knothe & Walle, 2019). Behavioral research suggests that children may also differentially prioritize the emoter and the referent across discrete emotion contexts. Heightened focus toward the emoter is observed in contexts of anger and sadness, demonstrated

by infants avoiding angry individuals (Camras, 1977; Walle, Reschke, Camras et al., 2017; Walle, Reschke, & Knothe, 2017) and directing help toward a sad experimenter (Svetlova et al., 2010). Conversely, children more readily identify threatening (e.g., snakes) over non-threatening stimuli (e.g., flowers; LoBue & DeLoache, 2008), and increase attention toward (Leitzke & Pollak, 2016) and physical avoidance of (Stevenson et al., 2010) disgust stimuli. Interestingly, joy contexts highlight both the emoter and the referent, with infants increasing proximity to joy-eliciting objects (e.g., Hornik et al., 1987) and preferring individuals expressing positive affect (e.g., Farroni et al., 2007). However, whether children’s verbal descriptions of emotional contexts mirror descriptions by parents and adults remains uninvestigated.

Current Study

We examined how children labeled and highlighted relational elements in discrete emotion contexts. We focused our research 3.5- and 4.5-year-old children given prior research indicating that children accurately identify the emotions of interest between 3- and 5-years-of-age (Widen & Russell, 2008) and may demonstrate differential attention to relational elements at 4-years of age (Leitzke & Pollak, 2016).

First, we observed child spontaneous labeling of discrete emotions when presented with images with a target character expressing the emotion toward a clear referent. Given prior research (e.g., Widen & Russell, 2003), we predicted that children of both age groups would be less likely to correctly label disgust than anger, sadness, fear, and joy. Second, we examined children’s mentioning of the emoter and the referent across discrete emotions. Importantly, it was not our intent to pit the relational elements against one another — after all, the emoter is *relating with* the referent, not competing with it. Thus, we compared mentioning of the emoter and mentioning of the referent to determine whether children differentially highlighted each element, respectively, across discrete emotion contexts. Based on prior research with parents and college students (Knothe & Walle, 2018, 2019), we predicted that children would mention the emoter more frequently when describing anger and sadness images than disgust and fear images. Conversely, we predicted that children would mention the referent more frequently when describing disgust and fear images than anger and sadness images.

Method

Participants

Forty-six child-parent dyads (40 female caregivers) completed the study across two age groups: 3.5-year-olds ($n = 22$, 13 female; $M_{\text{age}} = 3.53$ years, range = 3.23–3.7 years,

Fig. 1 Sample images from the picture book activity (from upper left: Anger, Disgust, Joy, Fear). All images were presented in random order, with exception that the same emotion was not repeated sequentially



SD = 0.23) and 4.5-year-olds ($n = 24$, 11 female; $M_{\text{age}} = 4.53$ years, range = 4.33–4.87 years, SD = 0.14). Eight additional dyads participated but were excluded because of child inattention ($n = 3$), a non-English language was spoken ($n = 3$), or experimenter error ($n = 2$). Prior research using similar methods and analyses have reported medium to large effect sizes. Thus, we anticipated medium effect sizes ($d = 0.50$) as a conservative estimate due to the difference in populations (i.e., adult vs. child talk). A power analysis using a medium effect size determined that a sample of at least 21 children for each age group would provide power of 0.80.

Participating families were recruited from the California Central Valley through Department of Public Health birth records and community recruitment events. Most families had an income between \$25,000 and \$40,000 (range < \$25,000 to > \$150,000). Child racial demographics reflected those of local area, with parents identifying children as 37% White, 35% mixed-race, 26% Hispanic, and 2% not answering.

All study procedures were in accordance with the Declaration of Helsinki and approved by the Institutional Review Board at the University of California, Merced. The data that support the findings of this study are available from the corresponding author upon reasonable request.

Materials

Stimuli

A picture book was comprised of sixteen 8" × 10" color photographs. The first image provided an example image to familiarize the parent with the task. This was followed by 5 images of different children's faces (gender-matched to the participant) expressing one of five discrete emotions (i.e.,

anger, sadness, disgust, fear, joy) to warmup the child to the subsequent emotion task of interest. The 5 face images were presented in random order.

The emotion task of interest consisted of 10 emotion context images that depicted an emotional scene featuring a single emoter (i.e., a male or female child for each of the 5 discrete emotions) displaying an emotion and a clear referent related to the emotion. The 10 emotion context images (5 emotions: anger, sadness, disgust, fear, joy; 2 genders) were randomly ordered with the exception that the same emotion context was never presented in succession. A unique child model and contextual scene was featured in each image.

Stimuli Selection and Validation

All context images contained a single emoter expressing (i.e., facially and posturally) one emotion (anger, sadness, disgust, fear, or joy) toward a single referent (an object; e.g., a phone, broccoli, dropped ice cream, puppy). All images included a child expressing the emotion to ensure consistency with images used in prior research (e.g., Knothe & Walle, 2018). The emotion expressions were of moderate intensity, and all images were previously validated as conveying the intended emotion (> 80% agreement for the target emotion; see Knothe & Walle, 2018). All emotional contexts were selected to be familiar events for children (e.g., receiving a gift; disliking a food) and thematically similar to previous vignette studies (e.g., Widen & Russell, 2010b). Example images are presented in Fig. 1, and further detailed descriptions of the images can be found in Knothe and Walle (2018, Fig. 1 and Appendix Tables A1 and A2).

Additionally, and unique to the present study, a sample of 28 college-aged participants (21 female) further validated the context images to ensure that the referent of the emotion was clearly identifiable. Adults correctly identified a clear

referent in all emotion context images, with an overall agreement of 83% (Anger = 78%, Sadness = 77%, Disgust = 87%, Fear = 85%, Joy = 90%).

Procedure

Each dyad completed the activity in a single campus visit. Upon arrival, a trained researcher provided an overview of the procedures to the parent and answered any questions. Parents then completed consent documents and a demographic questionnaire while the child engaged in a short warm-up period by playing with toys in the room.

Picture Book Activity

The parent and child were seated next to each other in separate chairs. Parents were asked to guide their child through the picture book and provided with the following instructions:

You will be guiding your child through this picture book. There are questions on the opposite page to each image. Please follow these questions but you may use some, or all, in whichever order you choose. Do not ask any leading questions, but asking general follow up phrases such as, ‘tell me more’ or ‘why?’ are fine. However little or much your child wants to say about each image is perfectly fine. Go at your own pace. Please do not point to any of the images but it is okay if your child points. We want their natural, unbiased response to the images.

Warm-up Images To begin, a non-emotional image (i.e., a kitten batting a flower) was provided with the instructions and used as an example image. After answering any parent questions, the experimenter and any siblings or additional adults left the room for the duration of the activity. To familiarize the child with primary emotions of interest, next the book featured 5 gender-matched images of children’s faces displaying a stereotypical facial configuration associated with the 5 discrete emotions of interest. Each face image was accompanied by a page on the opposite side of the book with the following questions: What do you see? What is she/he feeling? Can you tell me more? The face images were selected from the CAFES image set (LoBue & Thrasher, 2015) and featured a child (same-sex as the participant) displaying a clear emotion. Due to differences in the procedures and composition of the warm-up images and the images of primary interest to the study (i.e., the relational context images), no analyses of the warm-up images were conducted.

Relational Context Images Each relational context image was accompanied by a page with the following questions: What is going on? What do you see? What is happening? Can you tell me more?

These questions were provided as non-leading, neutral ways for the parent to guide the child and elicit verbal responses. The decision to use a parent rather than an experimenter for the picture book paradigm resulted from extensive piloting indicating that children were more comfortable and more verbal when interacting with their parent than an experimenter. Importantly, all coding and analyses identified and omitted any parent leading questions or off-task discussions (see coding sections below) so as to provide greater standardization across dyads and minimize parent-bias in children’s verbal behavior. The picture book activity lasted approximately 8:21 min ($SD = 2:31$ min). Two video camcorders on tripods recorded all parent and child behaviors.

Coding

Trained researchers naïve to the study hypotheses transcribed all verbalizations by the parent and child during the picture book activity. Next, the researchers coded each transcript for the variables of interest. A second researcher coded these variables for 25% of the transcripts. Coding disagreements were discussed, but the initial coding of the primary coder was maintained. Interrater reliability is reported below as a Pearson’s correlation coefficient with corresponding mean difference statistic for count variables, and as the percent agreement and corresponding kappa value for binary variables.

Child Talk

The total number of child words pertaining to each image were counted in each transcript to create a measure of *on task child words* (reliability: $r = 0.97$, $M_{\text{difference}} = 2.90$ words) for each page (i.e., trial). This variable was used to control for child verbosity in the analyses (see Analytic Strategy section below).

Talk relating to off-task topics (e.g., the child asking the parent what they would do after the activity) or responses to parent questions unrelated to the task (e.g., can you sit still?) were excluded from the total amount of child words. Importantly, parent questions or statements deviating from the provided list of parent questions were identified (reliability: 95% agreement, $k = 0.89$) and all child talk following such instances marked as off-task and not coded for the remainder of that trial. This decision was made due to observed changes of child talk following parent leading questions and

statements (e.g., What is she feeling? Why is he scared?). Parent leading utterances did not differ significantly across age groups, ethnicity, or income.

Researchers coded the transcript of each emotion trial for child talk featuring the following:

Correct Emotion Label Mentioning the target emotion or a related emotion term was considered an emotion label (Reliability: 94% agreement, $k = 0.88$). Emotion labels were coded dichotomously as either correct (1) or incorrect/absent (0). Related emotion words indicating the target emotion for anger (e.g., mad, frustrated), sadness (e.g., depressed, down, blue), disgust (e.g., gross, yucky, icky), fear (e.g., afraid, scared, frightened), and joy (e.g., happy, joyful) were coded as labeling the emotion.

Emoter The emoter in each image was classified as the individual displaying the emotion. Words indicating the emoter included but were not limited to: *he, she, him, her, boy, and girl*. Researchers coded the frequency of child mentioning the emoter on each page (Reliability: $r = 0.91$, $M_{\text{difference}} = 0.79$).

Referent The object or situation toward which the emotion was directed was considered the referent of the emotional display. Words indicating the referent included but were not limited to: *green juice, broccoli, dog, puppy, ice cream, spider, and homework*. Researchers coded the frequency of child mentioning the referent on each page (Reliability: $r = 0.76$, $M_{\text{difference}} = 0.21$).¹

Data Availability

The datasets generated during and/or analyzed during the current study are not publicly available due to privacy concerns relating to the participants being minors but are available from the corresponding author on reasonable request.

Results

General Analytic Strategy

Of central interest was whether each age group differentially labeled and described the images as a function of the discrete emotion. Given prior research examining child labeling as a function age and as a function of discrete

emotion, planned analyses of emotion labeling examined differences in correct labeling across emotions, between age groups, and within age groups (i.e., the Emotion x Age interaction term). Analyses of child mentioning the emoter and mentioning the referent were primarily interested in whether children in each group differentially mentioned each relational element across discrete emotions, not comparisons between age groups. Specifically, we were curious if each age group mentioned the emoter (or referent) more for one emotion versus another emotion, *not* whether a particular age group mentioned the emoter (or referent) more than another age group. Thus, while the Emotion x Age interaction term was included in these models, only planned comparisons within age group across discrete emotions were conducted.

Analyses were conducted using Generalized Mixed Linear Modeling using the Statistical Package for Social Sciences (SPSS) Version 23. All models controlled for child gender, trial number, on-task child words, and the gender of the child in the image. Child gender was included in the analyses given prior research with this age range finding gender differences in parent–child emotion talk (e.g., Adams et al., 1995; Cervantes & Callanan, 1998), and *on-task child words* was included in all models to control for child verbosity. We also controlled for the gender of the child in the image and the sizes of the emoter and the referent (for emoter and referent analyses, respectively) to ensure that any relevant effects could be attributed to the discrete emotion rather than compositional features of the images. Pairwise comparisons incorporated a Benjamini–Hochberg correction (Benjamini & Hochberg, 1995).

Emotion Labeling

Children’s spontaneous correct emotion labeling was analyzed with a binomial distribution, Satterthwaite approximation, robust estimation, compound symmetry covariance matrix, and identity link function. The estimated means and standard errors of child correct emotion labeling are presented in Table 1. The raw proportions of all emotion label responses for each emotion image are provided in the full confusion matrix in Supplemental Table 1 and 2.

The analysis revealed significant main effects of picture emotion, $F(4, 208) = 12.39$, $p < 0.001$, $\eta^2 = 0.19$, and child age group, $F(1, 48) = 12.85$, $p < 0.001$, $\eta^2 = 0.21$. However, the Picture Emotion x Age interaction was not significant, $F(4, 213) = 0.15$, $p = 0.96$, $\eta^2 < 0.01$.

Differences Across Discrete Emotions

Comparison of correct emotion labeling across discrete emotions revealed that overall, children were less likely to correctly label disgust than anger, $t(134) = 5.29$, $p < 0.001$,

¹ The somewhat lower reliability for the referent variable was likely due to the variety of words that could be used to denote the referent in an image. In particular, instances of “it” required inference by the coder to determine what “it” referred to.

Table 1 Estimated means and standard errors of correct emotion labeling

	Anger	Sadness	Disgust	Fear	Joy
Variable	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>
Overall	.67 ^{DF} (.06)	.68 ^{DF} (.05)	.21 ^{ASJ} (.05)	.29 ^{ASJ} (.06)	.57 ^{DF} (.07)
3.5-year-olds	.56 ^{4.5DF} (.09)	.56 ^{DF} (.07)	.13 ^{4.5ASJ} (.06)	.21 ^{AS} (.07)	.41 ^{4.5D} (.09)
4.5-year-olds	.76 ^{3.5DF} (.08)	.78 ^{DF} (.06)	.32 ^{3.5ASJ} (.07)	.40 ^{ASJ} (.08)	.72 ^{3.5DF} (.08)

Estimated means with standard errors in parentheses. Emotion label values represent the proportion of children providing a label for that emotion. Letters next to each mean (S sadness, F fear, A anger, D disgust, J joy) designate significant pairwise comparisons between emotions for each variable. For example, a significantly greater proportion of children labeled Anger (0.61) images than in Disgust (0.16) and Fear (0.07) images. Numbers next to each mean designate significant pairwise comparisons between age groups for each emotion

$d=0.91$, sadness, $t(231)=6.63$, $p<0.001$, $d=0.87$, and joy, $t(173)=4.52$, $p<0.001$, $d=0.69$. Additionally, children were less likely to correctly label fear than anger, $t(191)=4.78$, $p<0.001$, $d=0.69$, sadness, $t(296)=5.47$, $p<0.001$, $d=0.64$, and joy, $t(187)=3.57$, $p<0.001$, $d=0.55$.

Differences Across Age Group

Examination of the main effect of age group revealed that a greater proportion of 4.5-year-olds provided a correct emotion label than did 3.5-year-olds, $t(48)=3.76$, $p<0.001$, $d=1.09$.

Differences Between Discrete Emotions and Age Groups

A priori hypotheses and prior research suggested the likelihood of age-related differences in children's labeling of discrete emotions across age groups (e.g., Widen & Russell, 2003). Thus, further planned analyses compared age groups for each discrete emotion, as well as differences across discrete emotions within each age group.

Differences Between Age Groups for Discrete Emotions Pairwise comparisons tested differences between age groups for each discrete emotion. The older age group was more likely than the younger age to correctly label sadness, $t(317)=2.37$, $p=0.02$, $d=0.27$, and joy, $t(103)=2.56$, $p=0.01$, $d=0.50$. However, the difference in older children correctly labeling disgust compared to younger children did not survive the Benjamini–Hochberg correction, $t(210)=2.07$, $p=0.039$, $d=0.29$). Additionally, a trend indicated that 4.5-year-olds were more likely to correctly label fear than 3.5-year-olds, $t(246)=1.83$, $p=0.068$, $d=0.23$).

Differences Within Age Groups for Discrete Emotions

• 3.5-year-olds

Analyses of the younger age group revealed that 3.5-year-olds were more likely to correctly label anger than disgust, $t(139)=3.80$, $p<0.001$, $d=0.64$, or fear, $t(177)=3.09$, $p=0.002$, $d=0.46$. The younger children were also more likely to correctly label sadness than disgust, $t(298)=4.80$, $p<0.001$, $d=0.56$, or fear, $t(246)=3.59$, $p<0.001$, $d=0.46$, though the difference with joy did not survive the Benjamini–Hochberg correction, $t(419)=1.94$, $p=0.05$, $d=0.19$. Lastly, 3.5-year-olds were more likely to correctly label joy than disgust, $t(265)=3.05$, $p=0.003$, $d=0.37$, though the difference with fear did not survive the correction, $t(195)=1.99$, $p=0.048$, $d=0.29$.

• 4.5-year-olds

Analyses examining differences between discrete emotion within the older children revealed that anger were more likely to be correctly labeled than disgust, $t(125)=3.77$, $p<0.001$, $d=0.67$, or fear, $t(267)=3.78$, $p<0.001$, $d=0.46$. This age group was also more likely to correctly label sadness than disgust, $t(219)=4.81$, $p<0.001$, $d=0.65$, or fear, $t(428)=4.28$, $p<0.001$, $d=0.41$. Finally, 4.5-year-olds were more likely to correctly label joy than disgust, $t(124)=3.40$, $p=0.001$, $d=0.61$, or fear, $t(222)=3.14$, $p=0.002$, $d=0.42$.

Relational Context Descriptions

Descriptions of relational contexts were analyzed with a Poisson distribution with a Satterthwaite approximation, robust estimation, compound symmetry covariance matrix, and log link function. The estimated means and standard errors of child mentioning the emoter and referent are presented in Table 2.

Emoter

Analysis of children's mentioning the emoter in relational contexts revealed a significant main effect of picture emotion, $F(4, 179)=2.72$, $p=0.03$, $\eta^2=0.06$, but no significant effect of child age, $F(1, 55)=0.05$, $p=0.83$, $\eta^2<0.01$, or child gender, $F(1, 39)=2.02$, $p=0.16$, $\eta^2=0.05$. The Emotion x Age interaction term was also not significant, $F(4, 186)=0.74$, $p=0.57$, $\eta^2=0.02$.

Of central interest was whether children within each age group differed in mentioning the emoter across discrete emotions. Thus, planned comparisons tested differences across emotions within each age group.

Table 2 Estimated means and standard errors of frequency of mentioning relational elements by age group

	Anger	Sadness	Disgust	Fear	Joy
Variable	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>	<i>M (SE)</i>
3.5-year-olds					
Emoter	2.10 (0.20)	1.96 (0.20)	1.74 (0.22)	1.58 (0.19)	1.80 (0.22)
Referent	1.10 ^{FJ} (0.15)	1.46 (0.18)	1.51 (0.17)	1.69 ^A (0.16)	1.65 ^A (0.25)
4.5-year-olds					
Emoter	2.46 (0.28)	2.39 ^F (0.22)	2.38 ^F (0.23)	1.74 ^{DSJ} (0.23)	2.43 ^F (0.15)
Referent	1.35 ^{FJ} (0.16)	1.03 ^{DFJ} (0.13)	1.61 ^S (0.20)	2.03 ^{AS} (0.20)	2.13 ^{AS} (0.22)

Estimated means with standard errors in parentheses. Values represent the frequency with which children mentioned the emoter and the referent, respectively. Letters next to each mean (S sadness, F fear, A anger, D disgust, J joy) designate significant pairwise comparisons between emotions for each variable. For example, 4.5-year-olds mentioned the emoter significantly more in sadness images (2.39) than fear images (1.74)

3.5-Year-Olds Planned pairwise comparisons revealed no significant differences in 3.5-year-olds' mentioning of the emoter across discrete emotion images (all $ps > 0.08$).

4.5-Year-Olds Planned pairwise comparisons of picture emotion revealed that 4.5-year-old children mentioned the emoter significantly less often for fear context images than images depicting sadness, $t(190) = 3.13$, $p = 0.002$, $d = 0.45$, disgust, $t(273) = 3.14$, $p = 0.002$, $d = 0.38$, or joy, $t(139) = 3.09$, $p = 0.002$, $d = 0.52$, though the difference with anger did not survive the correction, $t(80) = 2.17$, $p = 0.03$, $d = 0.49$.

Referent

Analysis of children's mentioning the referent in relational contexts revealed a significant main effect of picture emotion, $F(4, 199) = 6.92$, $p < 0.001$, $\eta^2 = 0.12$, but no significant effect of child age, $F(1, 38) = 0.55$, $p = 0.46$, $\eta^2 = 0.01$, or child gender, $F(1, 39) = 0.01$, $p = 0.94$, $\eta^2 < 0.01$. The Emotion x Age interaction term also was not significant, $F(4, 152) = 1.22$, $p = 0.30$, $\eta^2 = 0.03$.

Again, we were primarily interested in whether children within each age group differed in mentioning the referent across discrete emotions. Thus, planned comparisons tested differences across emotions within each age group.

3.5-Year-Olds Planned pairwise comparisons of picture emotion revealed that 3.5-year-old children mentioned the referent significantly less often for anger context images than images depicting fear, $t(271) = 3.80$, $p < 0.001$, $d = 0.46$, or joy, $t(327) = 3.54$, $p < 0.001$, $d = 0.39$.

4.5-Year-Olds Planned pairwise comparisons of picture emotion indicated that 4.5-year-old children mentioned the referent significantly less often for sadness context images than images depicting disgust, $t(118) = 2.40$, $p = 0.02$, $d = 0.44$, fear, $t(105) = 3.54$, $p < 0.001$, $d = 0.69$, or joy, $t(327) = 3.75$, $p < 0.001$, $d = 0.41$. Older children also mentioned the referent significantly less when describing anger images than images of fear, $t(52) = 2.35$, $p = 0.02$, $d = 0.65$, or joy, $t(242) = 3.36$, $p < 0.001$, $d = 0.43$.

Discussion

Appreciating the relational aboutness of emotions is crucial for understanding others' emotions. We found that 3.5- and 4.5-year-old children varied in accurately labeling emotions and differentially emphasized relational elements across emotion contexts. This underscores the importance of considering the relational context when examining children's emotion understanding.

Emotion Labeling of Relational Contexts

Children's spontaneous emotion labeling was generally in line with prior research (e.g., Widen & Russell, 2003). Children in both age groups were more likely to correctly label anger, sadness, and joy more than disgust and fear. It is worth noting that our use of emotional context images was distinct from most prior research of children's emotion labeling. Specifically, children's accuracy in the present study was higher than observed in prior research. For example, 4.5-year-old children's correct labeling of disgust images (0.32) was noticeably higher than previously reported, such as 0.03 to 0.10 by Widen and Russell (2003, Study 2), 0.11 by Widen and Russell (2008), and 0.09 by Widen and Russell (2010a, 2010b, Study 2). Contextual elements provided in the present images may have provided more cues about the relational significance, and thus facilitated more accurate labeling of disgust expressions. However, it is also possible that relational information could make attention more diffuse or generate confusion when appreciating relational contexts. For example, one child described a girl expressing disgust toward a piece of broccoli on her fork as her blowing on the broccoli to "cool it off" before eating it. Our findings underscore the importance of considering emotional development as the child's ability to appreciate the relational significance between the individual and their environment.

Differential Highlighting of Relational Elements in Emotion Contexts

Novel to the present study, we found that children in both age groups differentially highlighted relational elements across

discrete emotion contexts, though this differentiation was more prevalent in the older age group. Specifically, 4.5-year-old children mentioned the emoter more frequently when describing anger, sadness, and joy images than fear images. Conversely, these children mentioned the referent of the emotion more when describing fear and joy images than those depicting anger and sadness, and more when describing disgust images than sad images. Older children's differential emphasis on the emoter across discrete emotions is similar to that observed with parents (Knothe & Walle, 2018) and college students (Knothe & Walle, 2019). However, differences in mentioning the referent only partially supported our predictions, with disgust failing to differentiate from anger. This may indicate that children's attention toward relational elements particularly relevant for disgust contexts is still developing at this age.

Interestingly, 3.5-year-olds demonstrated some differential mentioning of the referent, but not the emoter, across discrete emotion images. Like the older age group, 3.5-year-olds mentioned the referent less when describing anger images than those depicting fear or joy. However, this age group did not demonstrate as many significant differences across discrete emotions and had similar mentioning of the emoter across discrete emotion contexts. This may indicate that differential attention to relational elements of discrete emotion contexts is continuing to develop in early childhood, as even the older children failed to demonstrate the nuanced patterns of attention shown by adults (Knothe & Walle, 2018, 2019). However, it is also worth noting that while these children did not differentially describe elements of discrete emotional contexts, infants and toddlers do demonstrate differentiated behavioral responses to discrete emotions (e.g., Hornik et al., 1987; Walle, Reschke, Camras et al., 2017; Walle, Reschke, & Knothe, 2017). Such behavioral research suggests that younger children can appreciate referential specificity in emotional contexts, but verbal task demands in the present study may have obscured these capacities.

Additionally, a possible limitation was that our images were not standardized. For example, some images featured object-referents, whereas others featured agentic-referents. However, we believe it is unlikely that differences in referent agency accounted for the findings for two reasons. First, specifying whether the image had an agentic referent was not significant ($p = 0.68$) in models examining mentioning the referent. Second, comparison of the joy images, 1 of which featured an agentic referent and 1 that did not, indicated no significant difference in highlighting the referent between the two joy images, $t(430) = 0.43$, $p = 0.67$, $d = 0.09$. Even so, future research including more standardized images that control or tease apart such effects is recommended.

Future Directions

This study extends prior research of children's emotion labeling and is the first to demonstrate that children differentially

describe elements of discrete emotional contexts. Further empirical work and theoretical considerations for a relational perspective of emotion are described below.

Developmental Mechanisms

Our findings were generally consistent with parents' descriptions of emotional contexts to their infants (Knothe & Walle, 2018). Differential highlighting of specific aspects of emotional contexts may be socialized by the parent to the child. Indeed, prior research has demonstrated that parent talk about emotions predicts infants' goal-directed behavior in emotional situations (e.g., Brownell et al., 2013). Additional underlying mechanisms for consideration include the child's personal experience with emotion contexts (e.g., Pollak et al., 2009), observing others' attention and responding to emotional contexts (e.g., Repacholi et al., 2008), and cross-cultural differences in perceiving contextual elements (e.g., Masuda et al., 2008). Understanding mechanisms, such as culture, parent expressivity, and family dynamics (see Halberstadt & Lozada, 2011; Halberstadt et al., 2013), through which differences in appreciating emotions arise would bolster researchers' understanding of emotion and emotional development.

Visual Attention and Memory

Investigating children's visual attention to emotion contexts would lessen the verbal demand on young children (e.g., Scott & Roby, 2015), complement findings from verbal tasks (the present study), and extend prior work on children's visual scanning patterns of emotion faces and faces with postures (e.g., Nelson & Mondloch, 2017). Additionally, future work could examine how attention influences behavioral responses toward relational elements following a delay. For example, infants may have greater memory for a disgusting referent and subsequently avoid that object, whereas an angry person may be more memorable than the object that elicited the anger (see Repacholi et al., 2016). Such research would help investigators understand how infants attend to and retain specific aspects of emotion contexts (e.g., time looking at the emoter vs. the referent), how parent emotion talk may underlie such patterns, at what age differential processing is present, and whether the ontogeny of such differences is rooted in socialization or biological/evolutionary mechanisms (see Öhman & Mineka, 2001).

A Relational View of Emotion

These findings emphasize the importance of relational elements when perceiving emotions and the importance of examining differences in infants', children's, and adults' processing of emotional contexts (see Camras & Shutter,

2010). Recent research with adults highlights the importance of context when perceiving emotional expressions (e.g., Hassin et al., 2013). Research indicating the influence of facial expressions (Mumenthaler & Sander, 2012), postures (Aviezer et al., 2008), and scenes (Reschke & Walle, 2021) on emotion perception may result from differential attentional focus to emotional elements. We encourage future research that considers the relational nature of emotions, those features that make them functionally distinct from one another, and how such aspects of emotion understanding change throughout the lifespan.

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