

Factors Facilitating Emotion Understanding in Infancy: Commentary on Ogren and Johnson

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The development of emotion understanding constitutes the convergence of a host of processes that yield a related, yet qualitatively distinct, construct. The article provided by Ogren and Johnson (this issue, DOI: 10.1159/000511628) highlights three developmental processes likely to facilitate emotion understanding in childhood: family expressiveness, parent-child discussion of emotions, and child language. The authors' contribution to this complex and hotly debated topic in emotional development is timely and I agree with many of their points. However, their emphasis on processes present in early childhood risks underemphasizing factors likely to facilitate emotion understanding in infancy. In providing my own conceptualization of emotion understanding, this commentary seeks to complement their review by highlighting three additional factors important for the development of emotion understanding, specifically the infant's (a) early personal emotional experiences, (b) perception of emotion via nonexpressive channels, and (c) ability to form categories prior to the acquisition of language.

Defining Emotion Understanding

Emotions are an individual's relations with their environment on matters of personal significance with their goals (see Barrett & Campos, 1987). Thus, it follows that emotion understanding is how one appreciates others' relational significance with their perceived environment (Walle & Lopez, 2020). It is in this way that emotions can be differentiated from mere meaning-making or categorization. Specifically, in order to understand another's emotion in a particular context, it is insufficient to perceive a person's actions as goal-directed (e.g., the person is running in a forest); rather, the action must be perceived as significant to the individual's goals in relation with their environment (e.g., there is a bear chasing them), which thus manifests the presence of an emotion (i.e., fear). Lacking an appreciation of these relational elements precludes understanding of the individual's emotion. Thus, the action of running is goal-directed, but not emotional; the bear is an animal, but not in of itself fear-instilling (as when one sees a bear at a zoo); the fearful expression lacks meaning when stripped of context (see Dewey, 1895; Campos et al., 1989; Hassin et al., 2013). It is the convergence of these elements that constitutes the understanding of the person's emotion.

In this way emotion and emotion understanding are best viewed as emergent phenomena greater than the sum of their parts (see Coan, 2010). Pinning down emotion understanding to a single element, such as labeling or categorization, overlooks the complexity of what is to be understood (see also Barrett, 2020). For example, while a child may label an elephant or categorize an elephant as distinct from a lion, one would not conclude that the child *understands* the elephant: its biology, lifespan, ecosystem, evolution, etc. Likewise, labeling or categorizing a person as angry is insufficient for *understanding* the person's anger: its source, goal relevance, the person's prior history or coping potential, etc. (for a related point, see Main et al., 2017). Thus, emotion understanding emerges from an observer's attention to and processing of various aspects of the emotional context, and the coordination of these elements to understand the relational significance of the individual with their perceived environment (i.e., the emotion). No single element of the emotional context is necessarily prioritized or sufficient for emotion understanding. As a consequence, the development of the individual's ability to appreciate one contextual element (e.g., discriminating facial expression) is no more or less important than another (e.g., knowledge of cultural norms) for facilitating emotion understanding.

Factors Facilitating the Development of Infant Emotion Understanding

The above conceptualization of emotion, and by extension of emotion understanding, has important consequences for studying the development of emotion understanding. The factors described by Ogren and Johnson (this issue, DOI: 10.1159/000511628) are undoubtedly involved in the development of emotion understanding. However, the above theoretical stance brings to the fore other factors likely to facilitate emotion understanding at ages younger than those primarily reviewed by Ogren and Johnson (this issue, DOI: 10.1159/000511628). Below I describe three such factors for the development of emotion understanding in infancy.

Personal Experience Facilitates the Understanding of Relational Significance

The role of self-experience for development has a rich history in developmental psychology (e.g., Piaget, 1952; Held & Hein, 1963; Campos et al., 2000). Of particular relevance is the bidirectional developmental unfolding of infants' actions and their perception of others' actions

(e.g., Thelen, 1994; Kanakogi & Itakura, 2011). This research demonstrates that the infant's own perceptual and behavioral experiences facilitate their understanding of others' mental states. For example, 3-month-old infants' experience grasping objects via an experimental manipulation corresponds with their perception of an agent's reaching as goal directed (Sommerville et al., 2005), and 12-month-old infants' personal experience with the affordances of a blindfold corresponds with their interpretation of what an agent can see (Meltzoff & Brooks, 2008). Such personal experience interacting with the world is similarly likely to allow the infant to understand others' emotions.

Infants' emerging understanding of emotion is best viewed as a bidirectional process facilitated by their interaction with and response to an expanding social world (see Saarni et al., 2006). Indeed, changes in how infants express emotions provide insight into their personal experience of such encounters. For example, infant anger expressions develop markedly in the first year of life, progressing from general distress, to attention toward the goal blockage at 4 months, and then toward the agent inducing the blockage at 7 months (Stenberg & Campos, 1990). Likewise, the stimuli that may elicit fear and the degree of fear intensity to various stimuli change across infancy, particularly in the case of strangers (Scarr & Salapatek, 1970). Specific developmental transitions also change infants' emotional experiences, such as increased positive interactions and greater "testing of wills" reported by parents of walking infants (Biringen et al., 1995). Moreover, infants purposefully initiate emotional experiences, such as engaging in previously prohibited behaviors while referencing the caregiver (Dunn & Munn, 1985), with such instances providing opportunities to negotiate around the sources of such emotions (Kuczynski & Kochanska, 1990). The above research highlights that infants themselves are an important source for facilitating their understanding of emotion early in development (see Walle et al., 2012). Research systematically examining infants' experience with significant goal relations in the environment represents an exciting avenue for further research on this topic. For example, one might provide the infant an obstacle that either does or does not block the infant's goal, thereby eliciting an emotion of anger. Following such personal experience with the goal blockage, one might hypothesize that the infant would accurately anticipate and appreciate an agent's own goal relation with the obstacle and likely emotion.

The above points do not discount the role of socialization practices by the caregiver, such as emotion conversa-

tions, for developing emotion understanding. As highlighted by Ogren and Johnson (this issue, DOI: 10.1159/000511628), research examining parent-child emotion talk indicates that such conversations are present early in childhood (e.g., Lagattutta & Wellman, 2002), are used to highlight specific aspects of emotional contexts (Knothe & Walle, 2018), and influence child responding in subsequent emotional contexts (Brownell et al., 2013). However, an antecedent factor to such discussions rests in infants' first-hand emotional experiences that provide the basis for inferring the emotional experiences of others.

Relational Significance Involves Perceiving More than Facial Expressions

As with any emerging understanding, experience with emotion exemplars is central for differentiating and understanding emotions. Given the canonical approach that emotional expressions are central to emotion experience, it is unsurprising that emotion expressions have taken center stage in studying the emotional ecology of the developing human. Extensive research has tested infant discrimination (e.g., LaBarbera et al., 1976; Young-Browne et al., 1977; for an excellent review, see Walker-Andrews, 1997) and responding (e.g., Sorce et al., 1985; Walle et al., 2017; for a review, see Walle & Campos, 2012) to discrete emotions, as well as individual differences in such abilities (e.g., Pollak & Sinha, 2002; Pollak et al., 2009). Likewise, infants discriminate vocal expressions early in development (e.g., Flom & Bahrick, 2007), can use vocal expressions to guide their behavior (e.g., Mumme et al., 1996), and appreciate the specific concerns expressed through specific acoustic forms that such vocalizations may take (Dahl & Tran, 2016). The ontogeny of appreciating emotion communicated through posture, movement, and touch is less prevalent in the literature (e.g., Boone & Cunningham, 1998; Hertenstein & Campos, 2001; Weiss et al., 2001), but no less important for study. While emotional expressions serve important functions for social interactions, exclusive study of overt expressive channels risks missing other ways in which relational significance can be perceived.

Indeed, infants can perceive an emotion even when no overt emotional expression is provided. Consider studies that attempt to "control" experimenter expressivity (e.g., providing neutral expressions), only to find that child participants persist in responding to the context as emotional. For example, Newton et al. (2014) found that 18- to 20-month-old infants responded with prosocial behavior when an experimenter experienced loss, even when no

expression of sadness was communicated. Infants also demonstrate an expectation for particular emotions as a function of prior events (Hepach & Westermann, 2013; Skerry & Spelke, 2014; Reschke et al., 2017b; Wu et al., 2017, 2018), indicating that infants anticipate discrete emotions from the relational significance of a context when overt expressions were absent. Moreover, 15-month-old infants use an individual's previous emotional response to predict their emotions in future interactions (Repacholi et al., 2016), demonstrating that infants' person knowledge of the individual provided the necessary information regarding their likely emotion. This research indicates that infants go beyond simply perceiving a physical expression; they infer the person's mental state, their significant relation with the environment (see Reschke et al., 2017a).

Research utilizing more naturalistic and contextually embedded stimuli would further our understanding of what infants attend to in emotional contexts. For example, while infants may fixate on emotional faces, analyzing how visual attention is distributed across contextual elements and the temporal patterning of such attention is crucial for understanding how the infant processes the relational significance of the person with the environment (i.e., the emotion). One might predict that such divergence of attentional allocation from the person expressing the emotion to that which the person is emoting about follows a similar patterning as the emergence of secondary intersubjectivity in the first year of life. Such research would fill an important gap in our understanding of when infants discriminate emotional expressions and when they appreciate their relational meaning.

Clearly, exposure to emotional expressions plays an important role in facilitating the development of emotion understanding. However, emotional expressivity alone is insufficient to assess the infant's emotional ecology and the information utilized by the infant for their developing emotion understanding.

Categories of Relational Significance Can Exist without Language

Categories are useful in that they make "discriminably different things equivalent" (Bruner et al., 1956, p. 231). A conceptualization of emotion understanding as one's understanding of emotion categories can result in paradigms designed to elicit categorical responses to the stimuli. Because indices of categories are generally verbal in nature, interpretation of such empirical research can lead to a "linguacentric perspective" (Keil, 2003, p. v) of the phenomenon. However, while providing a label can serve

to constrain or expand one's categorizations (Waxman & Markow, 1995), it need not follow that labels are necessary for categorization.

A wealth of research indicates that preverbal infants have an early understanding of human emotion (see Ruba & Repacholi, 2020). Infants can discriminate (Flom & Bahrick, 2007), form perceptual categories of discrete emotions at 4–7 months (Ruba et al., 2017; White et al., 2019), and differentially respond to emotions at 4–10 months (e.g., Montague & Walker-Andrews, 2001; Walden & Ogan, 1988), well before emotion labels enter their vocabularies (e.g., Ridgeway et al., 1985). Such research indicates that language is not a necessary prerequisite for early emotion understanding in infancy. Furthermore, language is not sufficient for emotion understanding. For example, while young children readily assign an emotion label to a novel facial expression (Nelson & Russell, 2016), the addition of this label to the child's lexicon falls short of allowing them to understand the relational significance and communicative value of the expression. More concretely, although identifying and labeling a specific emotion category may be aspects of emotion understanding, they are insufficient in and of themselves to constitute emotion understanding.

This leads to a sensible empirical concern: without labels to help constrain categorical membership, how is the infant to make sense of a seemingly statistically noisy emotion learning environment? Researchers of language acquisition have found that infants are quite skilled at detecting statistical regularities (e.g., Saffran et al., 1996; Maye et al., 2002) and are more skilled at parsing the signal from the noise than previously thought (Suanda et al., 2019). In considering the emotion-learning environment, one's conceptualization of emotion is central for operationalizing the signal that is to be gleaned. Emotions conceptualized as an individual's expressions or behaviors yields an exceedingly noisy environment full of idiosyncratic displays. Conversely, emotions as verbal labels provide greater regularity of the signal but require that the infant understands language. However, emotions viewed as one's significant relations with the environment transcend the variability across expressions, people, and objects/events present, and prioritize a more abstract, yet reliable, signal. This functionalist perspective brings coherence to the equipotentiality and equifinality of emotion (see Walle & Campos, 2012; Walle et al., 2017). Indeed, in unsupervised learning conditions, young children can adjust categorical boundaries of emotion to be attuned to the person expressing the emotion (Plate et al.,

2019), though research using such paradigms with infants is needed. It would be interesting to conduct a study where instead of providing a novel emotion label or associating a label with a face (e.g., Nelson & Russell, 2016), the child instead observed a novel significant relation and corresponding novel expression. One could then introduce the emotion label to examine how its addition influenced the child's understanding of the previously unlabeled emotion.

The issue at hand is not whether humans form categories of emotion, but rather what is to be categorized. A view conceptualizing emotion as significant person-environment relations provides sufficient regularity of the signal and flexibility of its manifestation for categorization by the developing human. This is not to say that language is unimportant for the development of emotion understanding; Ogren and Johnson (this issue, DOI: 10.1159/000511628) provide a compelling review of how language facilitates and shapes emotion understanding. However, emphasizing language as necessary for or part and parcel of emotion understanding oversteps the theoretical foundation of emotion.

Conclusion

Viewing emotions, and by extension emotion understanding, as emergent constructs that are greater than the sum of their parts necessitates viewing their development as similarly emergent. Ogren and Johnson (this issue, DOI: 10.1159/000511628) highlight three aspects of the child's life likely to facilitate emotional understanding. In this commentary, I have presented three additional factors. Importantly, these elements, along with others (e.g., interpersonal responding; cultural knowledge), work together to foster the development of an ability greater than its component pieces, a construct broader than facial perception, perspective taking, or labeling.

Moreover, it is imperative that researchers not be constrained by the adult form of emotional understanding when considering its development. Just as Western perspectives have historically dominated the study of psychological processes, so too do researchers of development risk over-reliance on adult conceptualization of the construct for determining its presence and functioning in the developing human or nonhuman animal. To say that the developing human lacks an emotion at a particular age because its manifestation does not match that of the adult version places too central the "finished" form over that which develops. Moreover, development is charac-

terized not only by linear changes, but qualitative changes, as well. Thus, just as emotions are emergent, so too is their development, as basic processes develop, change, and coalesce. While cross-domain research on emotional

development is to be encouraged, it is essential that researchers keep in mind that it is the integration and interaction of these domains, rather than their mere presence, from which the construct develops.

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