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EUReKA! A Conceptual Model of Emotion Understanding

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Abstract

The field of emotion understanding is replete with measures, yet lacks an integrated conceptual organizing structure. To identify and organize skills associated with the recognition and knowledge of emotions, and to highlight the focus of emotion understanding as localized in the self, in specific others, and in generalized others, we introduce the conceptual framework of Emotion Understanding in Recognition and Knowledge Abilities (EUReKA). We then categorize fifty-six existing methods of emotion understanding within this framework to highlight current gaps and future opportunities in assessing emotion understanding across the lifespan. We hope the EUReKA model provides a systematic and integrated framework for conceptualizing and measuring emotion understanding for future research.

Keywords

emotion understanding; emotion recognition; emotion knowledge

Understanding emotion in the self and others serves important socioemotional goals across the lifespan. In children, emotion understanding ability is linked to social skill and prosocial behavior (e.g., Ensor, Spencer, & Hughes, 2011; Mostow, Izard, Fine, & Trentacosta, 2002) and fewer externalizing, aggressive, and oppositional problem behaviors (e.g., Cook, Greenberg, & Kusché, 1994; Denham et al., 2003; Schultz, Izard, & Bear, 2004). In adults, emotion understanding ability is associated with empathy, marital satisfaction, and self-esteem (e.g., Hall, Andrzejewski, & Yopchick, 2009; Koerner & Fitzpatrick, 2002; Pitterman & Nowicki, 2004) and less loneliness and social anxiety (Pitterman & Nowicki, 2004).

Despite the clear utility and value in understanding emotions, the field currently lacks a cohesive description of the specific skills embedded in the overarching concept of emotion understanding. The burgeoning of research which followed earlier models' inclusion of emotion understanding as a pillar of emotional competence (e.g., Halberstadt, Denham, & Dunsmore, 2001; Saarni & Harris, 1991; Salovey & Mayer, 1989) has led to the development of many measures of emotion understanding. Nevertheless, researchers have not often considered how these measures relate to the overarching construct of emotion understanding. Thus, when studies include different measures of emotion understanding, we often do not know the degree to which those measures capture shared or completely different subsets of skills within the larger construct.

This problem is even more pronounced when attempting to integrate definitions of emotion understanding across the lifespan, as different skill sets are highlighted for different age groups. For example, emotion understanding in adults is almost exclusively defined as the abilities to monitor and represent inner states, differentiate emotions in self and others, and understand the social and moral functions of emotions (e.g., Grünh, Lumley, Diehl, & Labouvie-Vief, 2013; Labouvie-Vief, Grünh, & Studer, 2010; Lane, Quinlan, Schwartz, Walker, & Zeitlin, 1990). These abilities are often aggregated into assessments of emotional complexity, with specific components rarely identified. In contrast, child definitions of emotion understanding emphasize the skills of labeling emotional expressions and attributing emotions to prototypical situations, and rarely include assessments of emotional complexity (e.g., Denham, Zoller, & Couchoud, 1994; Pons, Harris, & de Rosnay, 2004; see Cunningham, Kliewer, & Garner, 2009, for an interesting exception). Although these operational differences may reflect developmental differences in understanding emotions, some of the embedded assumptions (e.g., that adults achieve some absolute maximum of emotion understanding and that children lack it) constrain our ability to understand the full scope of emotion understanding. Thus, a comprehensive conceptual structure can help researchers to recognize measurement limitations and can serve to unite the field, both theoretically and empirically.

Providing shared and explicit definitions of the specific skills comprising emotion understanding can also help guide the appropriate use and interpretation of existing measures when relating emotion understanding to various other constructs. Finally, a good organizing model can guide development of future measures of emotion understanding by identifying skills not readily assessed, as well as those well saturated in the field. We believe this to be a particularly important contribution, as decades of research on emotion understanding present both redundancy and disparity concerning the components being assessed, while leaving potentially vital components of emotion understanding largely unstudied. Thus, the goals of this paper are to introduce the model of Emotion Understanding in Recognition and Knowledge Abilities (EUREKA) as an integrative model of emotion understanding, and to review the extant research within the lens of this model.

A Model of Emotion Understanding

We define emotion understanding broadly as “expertise in the meaning of emotion.” Specifically, we include within the EUREKA model the two higher-order abilities of emotion recognition and emotion knowledge, the specific measurable skills within these two broad abilities which we describe in detail below, and three foci of emotion understanding – how well we understand our own emotions (Self), how well we understand emotions in a specific other, such as a parent, spouse, coworker, or child (Other), and how well we understand emotions in the general population, for example, someone we don't know (General). Figure 1 depicts the two broad abilities of emotion recognition and emotion knowledge (with corresponding skills embedded) and the three overlapping columns representing the Self, Other, and General foci of emotion understanding.

Before describing the model further, we note three caveats. First, we recognize that identification of “expertise” in most situations will be embedded within a larger cultural

context, as emotions are constructed and construed within cultural models (Barrett, Mesquita, & Gendron, 2011; Halberstadt et al., 2001; Halberstadt & Lozada, 2011). In our model, we consider cultural cues and display rules and norms (see skills below) but we omit the very specific ways that cultures create shared understandings of emotion (e.g., ethno-theories of emotions as illnesses, identities, etc.), which serve to fulfill roles and functions within the culture. These may become relevant in future revisions of our model, but for now it may be understood that the specific instantiations of expertise and relations between them are likely to be culturally-embedded. Second, the EUREKA model makes no claims about the temporal or developmental structure of skills, but rather aims to identify and explicitly define the skill sets that comprise emotion understanding (for developmental considerations, see Barrett et al., 2011; Labouvie-Vief, DeVoe, & Bulka, 1989; Labouvie-Vief et al., 2010; Pons et al., 2004; Widen, 2013). Third, the EUREKA model maintains a level of flexibility, in that the current conceptualization may be revised to include additional skill sets.

Recognition and Knowledge as Broad Understanding Abilities

Previous research has generally acknowledged that a variety of skills are needed to define the overarching construct of emotion understanding; common to most definitions are skills related to the recognition and knowledge of emotion. Skills in labeling emotional expressions and using knowledge about emotions (e.g., emotional cause scripts) to attribute emotions to situations are common to many conceptualizations of emotion understanding, including emotion knowledge (Morgan, Izard, & King, 2010; Pons et al., 2004; Shaver, Schwartz, Kirson, & O'Connor, 1987), affective perspective taking (Denham, 1986, 1998), emotion understanding (Phillips, MacLean, & Allen, 2002; Saarni, 2000; Saarni & Harris, 1991), or even emotion intelligence (Mayer et al. 1999). Thus, to enhance parsimony and integrate existing definitions, we organize these skills into two broad abilities: emotion recognition and emotion knowledge.

In everyday life, it is apparent that both abilities are necessary to understand emotions. For example, in the context of performing a favor, emotion knowledge provides us with potential and expected emotional reactions (e.g., gratitude emotional script) and emotion recognition enables us to perceptually detect whether a display of gratitude is made (or not), and whether it is posed or genuine. We may also utilize our knowledge of others' emotional expressiveness and experiences to perceptually identify spontaneous emotional displays, thus resulting in a complex amalgamation of emotion knowledge and emotion recognition skills (e.g., Fabes, Eisenberg, Nyman, & Michealieu, 1991). Although these skills are likely intertwined, correlational analyses (Mayer et al., 1999; Mayer, Salovey, Caruso, & Sitarenios, 2003; Perez Rivera & Dunsmore, 2011; Thingujam, Laukka, & Elfenbein, 2012) and tests of factor structure (Barbosa-Leiker, Strand, Mamey, & Downs, 2014; Bassett, Denham, Mincic, & Graling, 2012) support emotion recognition and emotion knowledge as two distinct but moderately-related components of emotion understanding.

A more difficult question is what to include as the specific skills comprising emotion recognition and emotion knowledge. This is especially challenging as there are many assessments of skills, and yet these assessments are rarely utilized in conjunction with each other, and the associations between skills are still largely uncharted. Based on previous

theory and research (including Denham, 1986; Halberstadt et al., 2001; Labouvie-Vief et al., 2010; Mayer et al., 1999; Pons et al., 2004; Saarni & Harris, 1991), we begin the process of identifying skill sets, and welcome revisions in future iterations of the model.

Emotion recognition skills—In our current conceptualization, emotion recognition utilizes visual and/or auditory cues across a variety of modalities (i.e., face, body, and voice), and is comprised of four skill sets: (1) awareness that an emotion has been expressed, (2) labeling of prototypical expressions, (3) labeling of non-prototypical expressions, and (4) use of contextually-relevant cues in identifying and labeling emotions.

Awareness refers to the detection of emotional information in any given communication (Halberstadt et al., 2001; Saarni, 2000), and likely guides more downstream recognition skills, as acknowledged in other models (e.g., social information processing model; Dodge, 1986). An example of awareness would be a shift in a parent's or spouse's voice, which may signal the availability of emotional information. One then has to determine what the signal means. Awareness can be assessed through tasks that allow individuals to discern whether there is any emotion expressed. For example, including a “neutral” or “no emotion” option as a response to emotions presented in varying intensities, or asking participants to identify when in the flow of an interaction an emotion appears, allows participants to reveal their awareness “thresholds” for emotional communications.

The process of labeling—identifying whether a parent's or spouse's vocal shift signals anger, distress, or careful intonation using a neutral tone of voice to conceal feelings—involves interpreting the signal as conveying specific emotional meaning (e.g., Denham, 1986; Pons et al., 2004). We separate labeling of prototypical expression, which is utilized primarily in research studies, from the labeling of non-prototypical expression, which is more ecologically valid given the prevalence of non-prototypical expressions in real life. Non-prototypical expressions include subtle or spontaneous displays of emotion, mixed or suppressed expressions, and authentic or non-authentic expressions.

A fourth skill set involves recognizing emotions within the ongoing flux of a context. Sometimes context may facilitate recognition, in that individuals can utilize relevant contextual cues (such as cultural scripts and situation-specific clues) to detect and identify emotions, but often the context will also require identifying which cues are relevant, which cues are not relevant, and discounting irrelevant information (e.g., Barrett et al., 2011; Halberstadt et al., 2001; Saarni, 2000). For example, cultural learning and shared expressive style may give in-group members an advantage to recognize emotional expressions compared with members of a different culture (e.g., Elfenbein, 2013; Laukka, Neiberg, & Elfenbein, 2014). Additionally, recognition may depend on dynamic contextual cues tied to the situation in which emotions are expressed—these cues may be particularly relevant in identifying ambiguous expressions (Barrett et al., 2011).

Emotion knowledge skills—Emotion knowledge is comprised of five skill sets that incorporate information regarding: (1) internal and external causes of emotions, (2) the qualities of emotions, including the structure, timing, and sequencing of emotion, (3) consequences and functions of emotions, (4) cultural rules and norms, and (5) management

of emotions including the breadth of and most appropriate strategies available for a given situation.

Emotions may be more internally (e.g., desires, beliefs) or externally (e.g., events, social cues) caused; knowledge of causes in general allows us to predict how an individual may feel given that information (e.g., Denham, 1986; Pons et al., 2004; Saarni & Harris, 1991). For example, receiving flowers when sick may elicit feelings of happiness in the receiver; anticipating that the flowers made someone happy may also elicit happiness in the giver. Knowledge regarding the qualities of emotion refers to the understanding that emotions are dynamic properties (Labouvie-Vief et al., 2010; Mayer et al., 1999); thus, emotions may exist independently or simultaneously, at varying intensities, and with some stability or change over time. Knowledge regarding emotion consequences refers to the understanding that emotions serve many functions (e.g., communication, motivation) and contribute to the effects of our actions. Thus, we may use emotions to obtain certain desired results or outcomes (Izard et al., 2011; Tamir, 2009), such as deliberately cultivating feelings of anger to exert dominance when confronting an opponent (Ford & Tamir, 2012).

Knowledge regarding cultural rules and norms includes display rules, base rates, and other information afforded by a culture (broadly defined) that influences the expression, experience, and recognition of emotion (e.g., Halberstadt et al., 2001; Saarni, 2000). For example, we apply display rules regarding death and the celebration of life to determine whether intense displays of negative or positive affect are normative or informative at a funeral. Management refers to regulating emotions; thus, knowledge about management includes knowing that emotions may be controlled, as well as potential strategies and relative benefits and disadvantages for each strategy (e.g., MacCann & Roberts, 2008; Pons et al., 2004). For example, suppression is a viable method for inhibiting the expression of anger, but we may recognize the advantages of reappraisal when seeking relief from the subjective experience of anger, even before anger has been experienced (Gross, 2001).

It is important to note that each skill set within both emotion recognition and emotion knowledge can vary along dimensions of difficulty and complexity. For example, the labeling of a happy facial expression can vary from easy – recognizing a wide, open-mouthed smile – to difficult – recognizing a faint smile with lips pressed together. Similarly, knowledge about the causes of disappointment can vary from rather simple – failed expectations cause disappointment – to rather complex requiring the integration of several pieces of information—for example, the importance of the goal, likelihood of achieving expectations, and locus of control.

Foci of Understanding

An important and unique feature of the EUREKA model is the explicit differentiation between the three foci of emotion understanding, that is, who is being understood. This has been implicitly included in previous theoretical models (i.e., understanding emotions in self and others; see Denham, 1998; Halberstadt et al., 2001; Labouvie-Vief et al., 1989; Lane et al., 1990; Shaver et al., 1989). Emotion understanding can be applied to the self, specific others, or others in general. The focus on the “Self” refers to the understanding of one's own emotions. This includes recognizing the emotional states of the self and knowing how the

self emotionally reacts in different contexts: I can tell when I am mad and I easily get mad when I am around my sibling. The focus on “Other” involves the understanding of emotion in specific others, or people that the self knows directly or personally. That is, an individual has some specific knowledge and experience about how that known other person shows emotions and may react in different contexts: My father hardly shows any emotions; though, if he does, you don't want to be around. The “General” focus involves the understanding of emotion in others in general (people for whom one has no personal information) or the population average. Thus, the general focus incorporates the idea of how people typically display emotions and how people typically react in different contexts: People frown when they are sad and people are sad when a loved one passes away.

By explicitly incorporating the foci of emotion understanding, the EUREKA model distinguishes emotion recognition and emotion knowledge depending on the person that is to be emotionally understood. For example, the knowledge of what may cause happiness in one's self; the knowledge of what may cause happiness in one's parent, spouse, coworker, or child; and the knowledge of what may cause or reflect happiness in most people might not be the same. One reason contributing to different knowledge of different foci is that people react differently to the same context: People are typically happy when receiving gifts; I feel primarily embarrassed, though, from all the attention when I receive a gift; my grandmother feels angry because she thinks gifts are a waste of money. Similarly, recognizing an emotion in a stranger, in one's parent, spouse, coworker, or child, and in oneself might differ substantially. Although the importance of distinguishing between different foci is obvious once stated, we know little about the degree to which understanding of others and self are related, or the degree to which we utilize these sources to make inferences about how others react.

The three foci of emotion understanding are visualized by three overlapping columns in the EUREKA model (see Figure 1) to illustrate that we may utilize different foci or knowledge sources to understand emotions. For example, for understanding how a specific other might experience rejection, we may utilize generalized emotion knowledge (General), we may combine this with emotion knowledge about specific others (Other), or with our past experiences (Self), or in any combination of these foci: I don't know how my daughter feels about breaking up with her first love, but I know how I and my friends felt. The representation of the foci by three columns is also a simplification. To be more accurate, there should be columns for many specific others, as people experience and express emotions differently. We may even demonstrate preferences for some others: My classmate is very similar to my brother and I know how my brother feels, so my classmate must feel the same. We provide these examples to argue that people are able to flexibly incorporate these different knowledge sources, further adding to the complexity in assessing emotion understanding. The degree to which such possibilities exist remains an important empirical question.

Measuring Emotion Understanding

In addition to providing a framework for organizing and interpreting the literature on emotion understanding, another goal for the EUREKA model is to foster awareness of

existing measures and support the development of new measures assessing this rich construct. One way of doing this is to identify and place current measures of emotion understanding within the EUREKA model. This may help researchers to select measures of emotion understanding most appropriate for their goals, and to help the field to detect potential gaps in assessment.

Measure Selection and Coding

We conducted a PsycINFO search of articles published from 2009 to January 2014 to identify both common and novel methods of assessing emotion understanding represented in the recent literature. This approach allowed us to include one instantiation of all the well-established measures of emotion understanding and to identify as many novel measures as possible to diversify our measurement toolbox. Key search terms included: emotion understanding, emotion recognition, emotion knowledge, emotion awareness, emotion perception, emotion complexity, emotion competence, emotion comprehension, affective competence, affective understanding, affective knowledge, affective perception accuracy, and *affective perspective taking*.

We searched for well-established measures that were frequently cited in the literature as well as novel measures that provided unique approaches to studying emotion understanding, particularly with regards to the assessment of unique skill sets or foci. We aimed to include measures used at different ages including measures for use with children, adolescents, and adults. We excluded measures designed for infants because these methods systematically differ from other methods due to the developmental demands of infants, and we excluded measures designed for atypical samples with existing biological, cognitive, or social impairments (e.g., dementia patients; individuals on the Autism spectrum; substance abusers). We also omitted measures using essentially the same methodology as numerous other measures with only slight variations, retaining either the first publication of a well-established measure or a frequently cited instantiation of that measure. Given that our initial search yielded over 5000 articles, we may have missed measures; however, our careful search process was designed to ensure that most currently available measures are represented, and that all categories of measures have been included.

We found 56 unique methods of measuring emotion understanding. To locate these methods within the structure of the EUREKA model, the first two authors coded each measure for the ability, skill, and focus of the assessment. Discrepancies were resolved by discussion among all authors. Measures were obtained through published articles and by request. Table 1 presents measures assessing emotion recognition ability and Table 2 presents measures assessing emotion knowledge ability; citations represent primary sources. The eleven measures assessing both abilities are listed in a separate section in both tables. To aid organization, emotion recognition measures are grouped into sections by the type of presentation: prototypical static, single-channel measures; static, morphed images; prototypical dynamic, multi-modal stimuli; and naturalistic measurement techniques. Emotion knowledge measures are grouped into either prototypical vignettes or open-ended response measures. These groupings were methodologically based and do not imply conceptual differences.

The columns represent the skills; letters listed as entries indicate the focus as S (self), O (other), and G (general). Given that a measure might assess multiple foci, any combination of the three letters is possible. Because some measures could be expanded to assess specific skill-foci combinations for which the measure has not yet been used, we coded potential scoring as well; thus, we included lower-case letters, s (self-potential), o (other-potential), and g (general-potential), to designate that this measure has the potential to be used for this additional skill-focus. For example, emotion recognition measures utilizing naturalistic methods such as recognition of familiar others' emotions during ongoing interactions (referred to as *in vivo* decoding; e.g., Dunsmore, Her, Halberstadt, & Perez-Rivera, 2009) often include spontaneous expressions of emotion in the Self and Other; such measures may also include prototypical expressions of both Self and Other foci, as well as the use of contextual cues to recognize emotions in the Other. Finally, we report the primary age groups for which the measure or technique was designed.

EUReKA Findings

Our coding of measures within the EUReKA model revealed four major findings. First, as noted, only eleven measures (20%) assess both of the broad abilities of emotion recognition and emotion knowledge. This scarcity of measures including both abilities likely contributes to the lack of comprehensive assessment of emotion understanding in empirical studies. It is important to note that some studies do include measures of emotion understanding spanning both abilities (e.g., Mayer et al., 2003; Perez Rivera & Dunsmore, 2011; Thingujam et al., 2012); these studies are arguably more inclusive in their assessment of emotion understanding. However, our review of the literature suggests that most studies rely on measures assessing only one broad ability to represent the construct of emotion understanding. The lack of simultaneous measurement of emotion recognition and emotion knowledge within the same study hinders interpretation of findings across studies because emotion understanding then implies different abilities. Thus, we recommend that researchers include both emotion recognition and emotion knowledge measures so as to comprehensively reflect the construct of emotion understanding.

Second, as a field, we seem over-reliant on single-skill assessments within the broad abilities; fully one-quarter (25%) of the measures assess only one specific skill. Although these measures can be combined to collectively reflect a variety of skills, single measures by themselves limit interpretations regarding emotion recognition or emotion knowledge as a unified expertise. Approximately 64% of measures assess two to three skills, and two emotion knowledge measures assess four skills. All available skills are included in only three emotion recognition measures (see Dunsmore et al., 2009; Magill-Evans, Koning, Cameron-Sadava, & Manyk, 1995; Rosenthal, Hall, DiMatteo, Rogers, & Archer, 1979) and one emotion knowledge measure (see Lane et al., 1990). All other things being equal (e.g. psychometric properties, time demands), we suggest selecting measures that include multiple skills over single skill assessments.

Third, the skills within the broad abilities do not receive equal amounts of attention. Not surprisingly, skills that receive the most attention are those that are most easily measured. For example, labeling prototypical expressions is included in 82% of emotion recognition

measures; knowledge about causes is included in 88% of emotion knowledge measures. However, other skills receive substantially less attention. For example, labeling expressions in context is included in 36% of emotion recognition measures; knowledge about the qualities of emotion is included in 24% of emotion knowledge measures. The reliance on only a few types of skills leads to a lack of diversity and reduces what we can know about emotion recognition or emotion knowledge, particularly within ecological and cultural contexts.

Fourth, the vast majority (88%) of measures assess emotion understanding with only a General focus. For emotion recognition, the focus is almost entirely General, with 97% measures relying on recognition of emotion for people unknown to the participant, and 6% for Self, 6% for Other. Only 9% of the measures include two foci. The situation with emotion knowledge measures is almost as challenging, with 82% measures assessing knowledge of emotions for people unknown to the participant, and 35% for Self, 9% for Other. Only 26% of the measures include two foci. No measures include all three foci. These findings likely reflect the methodological ease with which measures of generalized others are constructed; it may be easier to establish criterion validity for items assessing the recognition and knowledge of generalized others' emotions than of the self, a parent, spouse, coworker, or child. However, the lack of Self or Other focus constrains what we know about emotion understanding skills in highly important and relevant domains, limits the ecological validity of current emotion understanding measures, and hinders understanding of the development of these skills, as they likely emerge and develop within familiar contexts, such as family or work settings (Castro, Halberstadt, Lozada, & Craig, 2014; Eisenberg, Cumberland, & Spinrad, 1998; Halberstadt et al., 2001).

Conclusion and Future Directions

The construct of emotion understanding remains relatively unmapped despite the proliferation of research on this rich construct. To summarize our review we emphasize five general points and a final caveat. First, as noted above, the measures used to assess emotion understanding do not often reflect the breadth of conceptual definitions. Given that numerous skill sets comprise expertise in emotion understanding and many measures assess only a subset of the possible skills within these skill sets, measures of emotion understanding often do not match broad conceptual definitions. We hope the specificity in the current review will help future researchers to be more specific in their conceptual definitions of emotion understanding.

Second, future research would benefit greatly from investigating multiple skills of emotion understanding. This may be achieved by creating new measures that include skills within both emotion recognition and knowledge, particularly skills noted in this review as needing more empirical attention. Alternatively, the EUREKA model may serve as a practical guide for the selection of existing measurements that assess a wide variety of skills of interest to researchers. In particular, some measurement methods have adaptability for assessing more skills than originally intended (e.g., Dunsmore et al., 2009; Lane et al., 1990), and/or include assessment of skills less frequently studied (e.g., Fabes et al., 1991; Mayer et al., 1999).

Either option would enhance coherence in the assessment of emotion understanding across studies.

Third, our analyses of existing measures suggest that both child and adult measures of emotion recognition and emotion knowledge fit well within the conceptual scope of emotion understanding. Certainly emotion understanding skills are complex enough that they likely continue to develop throughout the lifespan, and our review suggests that we can and do measure similar emotion understanding skills at different ages. That is not to say that such skills appear the same at different ages; rather, skills likely demonstrate continuity and discontinuity with age, with changes in complexity of understanding as well. We hope our review will encourage future researchers to think about emotion understanding as a dynamic expertise that develops across the lifespan, as an individual must understand emotions as a young child, as an adolescent, and throughout adulthood.

Fourth, our review highlights the need for more detailed information regarding the structure of emotion understanding skills. Although our selection of abilities and skill sets was theoretically and empirically driven, the degree to which this structure is supported across contexts, and different groups relating to age, ethnicity, and gender, remains an important empirical question. Future research should compare skills within and across the broad abilities of emotion recognition and emotion knowledge. Such information would indicate to what extent emotion understanding skills are, in fact, related, whether there are additional groupings beyond the two broad abilities identified here, and the degree to which relations among skills may differ between groups, such as age groups. For example, there are good reasons to imagine that emotion recognition and emotion knowledge become more differentiated abilities during childhood and adolescence; such differentiation may peak in middle adulthood and we may expect dedifferentiation of skills in old age (Labouvie-Vief et al., 2010). Having measures or methodologies that span multiple age groups would allow us to test the structure of emotion understanding at different ages in the lifespan. Further, such measures would allow for the test of whether there are different age-related trajectories for different skills within abilities.

Fifth, the EUREKA model points out the large gap in our knowledge about how we understand emotions in the self and specific others. Researchers would likely agree that such understanding constitutes an important component of everyday functioning. Assessing all three foci will allow us to test numerous hypotheses, including whether these three foci of understanding develop in concert with each other, whether individuals of different ages differentiate their understanding of emotions by these three foci, whether such differentiation becomes stronger or weaker over time, and whether understanding emotions in specific others provides a foundation for internal working models about others' emotional behaviors, as has been initially demonstrated by research with maltreated children (Pollak, Cicchetti, Hornung, & Reed, 2000). We expect that individuals do differentiate their understanding of emotions by foci. Through experience, we know that different people's feelings may differ within the same context. Indeed, individuals' descriptions of their own emotional episodes and episodes of the same emotion in general differ in many features (Shaver et al., 1987). We also expect age-related differences in the utility of specific foci in understanding emotions. The ability to understand specific others' emotions may be

particularly important for both very young children who are reliant on known others for many of their needs (Halberstadt & Lozada, 2011), and for older adults who may rely on contextual cues and past experiences to compensate for losses in sensory functions and cognitive abilities (Isaacowitz & Stanley, 2011; Raters, Blanke, & Riediger, 2013). Thus, future research may investigate questions regarding the relation between understanding across different foci. We strongly argue that this is a likely process by which emotions are understood; yet as a field we must first devise measurement methods to capture those processes.

We worked hard to include a full and diverse representation of emotion understanding measures in our review (see Tables 1 and 2). We are hopeful that this work will guide future conceptual and empirical assessments of emotion understanding. However, we have deliberately omitted evaluations of formal assessments of measurement reliability or validity, as doing so would substantially lengthen the manuscript and detract from our main goals to comprehensively describe the rich construct of emotion understanding and to organize and integrate current assessments of emotion understanding in childhood and adulthood. Thus, we do not endorse any specific measures, and, as always, encourage researchers to consider psychometric properties including reliability and validity when selecting measures for use in research. Validation assessments should also include other emotion understanding measures that sample similar skill sets, as well as measures that sample other aspects of the overarching construct of emotion understanding (such as distinct skill-foci combinations). Such considerations are likely to result in the creation and use of measures which more comprehensively represent the range of emotion understanding skills, as well as contribute to the literature on the structure of emotion understanding skill.

In sum, the EUREKA model attempts to provide a unified conceptual framework for the field of emotion understanding. We hope that the model will generate research in testing the structure of the EUREKA model and its corresponding ideas. It is clear that the field of emotion understanding is in a state of growth and renewal and we hope that our review of existing measures within the EUREKA model will guide future work on emotion understanding.

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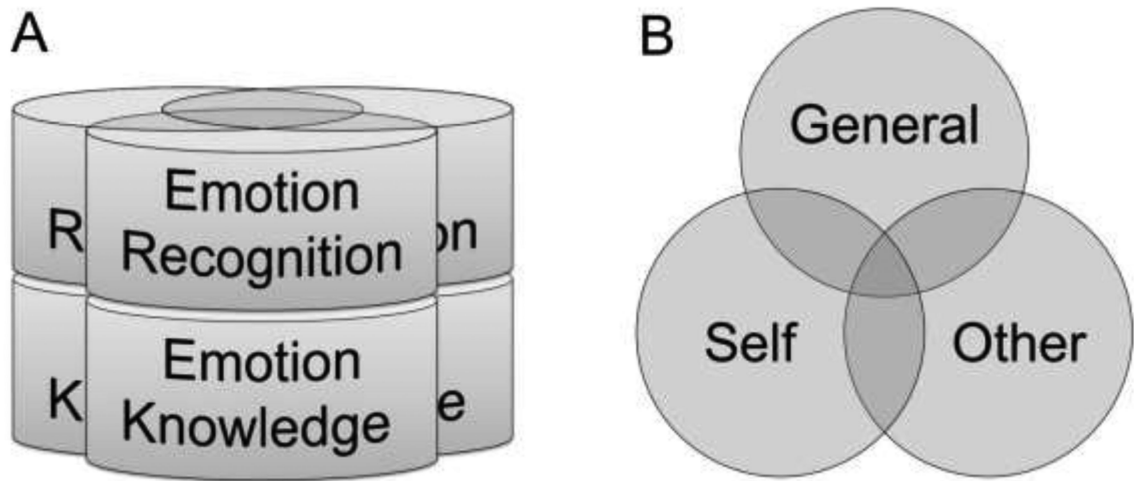


Figure 1.

The EUREKA model constitutes emotion understanding as the two broad abilities of emotion recognition and emotion knowledge (A) and the three overlapping columns representing the different foci (B). Abilities and foci are arranged for ease in presentation, and thus do not assume some type of temporal or developmental hierarchy or structure.

Table 1

Measures of Emotion Recognition by Specific Skills and Foci

Measures	Emotion Recognition Skills		
	Awareness	Labeling Prototypical Expressions	Labeling Non-prototypical Expressions
<i>Prototypical static, single-channel</i>			
Bowers et al. (1999); FAB ^{bcd}	G	G	G
Ekman & Friesen (1974); BART ^d		G	
Field & Walden (1982) ^a		SG	
Kusche et al. (1993); KEI ^{ab}		G	
Laukka et al. (2010); VENEC ^d	G	G	§
Matsumoto et al. (2000); JACBART ^d	G	G	§
Nowicki & Duke (1994); DANVA2 ^{abd}		G	
Parker et al. (2013); CARE ^a	G	G	§
Tuminello & Davidson (2011) ^{ab}	G	G	G
Sauter et al. (2013) ^{ab}	G	G	
Scherer & Scherer (2011); ERI ^d	G	G	§
<i>Static, Morphed images</i>			
Montagne et al. (2005) ^d	G	G	G
Montirosso et al. (2010); AFFECT ^{abc}	G	G	G
Pollak et al. (2009) ^b	G	G	G
<i>Prototypical dynamic, multi-modal</i>			
Banziger et al. (2009); MERT ^d		G	
Crane & Gross (2013) ^d	G		G
Rosenthal et al. (1979); PONS ^d	G	G	§
Magill-Evans et al. (1995); CASP ^{abc}	G	G	§
Moraitou et al. (2013); EET ^d	G	G	G

Measures	Emotion Recognition Skills			
	Awareness	Labeling Prototypical Expressions	Labeling Non-prototypical Expressions	Labeling in Context
Trimboli & Walker (1993); CAST ^d <i>Naturalistic</i>			G	G
Buck (1976); CARAT ^d	G		G	
Dunsmore et al. (2009) ^{bd}	SO	so	SO	o
<i>Measures including both EK and ER</i>				
Barbosa-Leiker et al. (2014); EUA ^a		G		
Denham (1986) ^a		G		
Fabes et al. (1991) ^a				og
Kalokerinos et al. (2014) ^d			G	G
Mayer et al. (1999); MEIS ^{cd}	G			
Mayer et al. (2002, 2003); MSCEIT ^{bcd}		G		
Morgan et al. (2010); EMT ^a		G		s
Pons et al. (2000, 2004); TEC ^{ab}		G		
Schultz et al. (2004); ACES ^b		G		
Steele et al. (1999); TAT ^a		G		
Strayer (1980) ^a			G	G

Note: Target age groups for each measure are reflected as follows:

Cells reflect the assessed foci (upper-case) and potential foci (lower-case) in the skill: S,s = self; O,o = other; G,g = general.

^aEarly Childhood

^bMiddle Childhood

^cAdolescence

^dAdulthood.

Table 2

Measures of Emotion Knowledge by Specific Skills and Foci

Measure	Emotion Knowledge Skills				
	Causes	Quality	Consequences	Rules and Norms	Management
<i>Measures including both EK and ER</i>					
Barbosa-Leiker et al. (2014); EUA ^a	G				
Denham (1986) ^a	G				
Fabes et al. (1991) ^a	og				
Kalokerinos et al. (2014) ^d				g	g
Mayer et al. (1999); MEIS ^{cd}	G	G			G
Mayer et al. (2002, 2003); MSCEIT ^{bcd}	G		G		G
Morgan et al. (2010); EMT ^a	G				
Pons et al. (2000, 2004); TEC ^{ab}	G				G
Schultz et al. (2004); ACES ^b	G				
Steele et al. (1999); TAT ^a	G				
Strayer (1980) ^a	G				G
<i>Prototypical vignette EK measures</i>					
Burnett et al. (2011) ^{bc}	S	S		sg	
Chow & Berenbaum (2012); PAUSE ^d			S		
Cunningham et al. (2009) ^{bc}	SG	SG			S
Denham et al. (1994) ^a	G				
Harwood & Farrar (2006) ^a	SO				
Jenkins & Ball (2000) ^b					G
MacCann & Roberts (2008); STEU ^d	G				
Nelson et al. (2013) ^a	G				

Measure	Emotion Knowledge Skills				
	Causes	Quality	Consequences	Rules and Norms	Management
Ribordy et al. (1988); ERQ ^a	G				
Ruby & Decety (2004) ^d	SO				
Schmidt-Atzert & Buhner (2002); TEMINT ^d	G			G	
Sidera et al. (2013) - task b ^a				S	S
Sidera et al. (2013) - task c ^a	G			G	G
Urberg & Docherty (1976) ^{ab}	SG			SG	
Zajdel et al. (2013) ^{abc}	G	G			
<i>Open-ended EK measures</i>					
Lane et al. (1990); LEAS ^{bcd}	SG	sg	sg	sg	sg
Friend & Davis (1993) ^{ab}	G			G	
Kats-Gold & Priel (2009); KAI-R ^b	SG	G			G
Labouvie-Vief et al. (1989) ^{bcd}	S	s		s	S
Salmon et al. (2013) ^a	S				
Schultz et al. (1989); INSI ^b	G		G		g
Underwood et al. (1992) ^{bc}	Sg		Sg	Sg	
Vitulic (2009) ^{bc}	G	G		G	G

Note. Target age groups for each measure are reflected as follows:

Cells reflect the assessed foci (upper-case) and potential foci (lower-case) in the skill: S,s = self; O,o = other; G,g = general.

^aEarly Childhood

^bMiddle Childhood

^cAdolescence

^dAdulthood.