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Emotion

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Definition

Emotions are a complex set of behaviors produced in response to some external or internal event that serve to motivate and direct thoughts and actions. The word "emotion" stems from the Latin e- (out) and movere (move). Emotions are generally thought to be processes, rather than states. Emotions are not equal to feelings. Feelings are the subjective representation of the emotional process. Emotions refer to the range of chemical and neural responses that are produced by the brain in response to a relevant stimulus. Emotions are comprised of a broad array of components including subjective experience, verbal description, physiological response, motivational influences, and behavioral expression. Emotions are often understood as social processes (Salovey, 2003). Throughout the lifespan, most emotional experiences and responses are contextually anchored in social relationships, and emotions become meaningful in the interaction with other people (Ekman, 1992; Frijda, 1986). Vice versa, emotions serve to regulate social interactions, and the way emotions are exchanged defines our social relationships. In short, emotions are dynamic processes that create and are created by the relationships with others. A general differentiation is made between basic emotions (happiness, sadness, fear, and anger, sometimes completed with disgust and surprise) and secondary emotions (also referred to as complex, cognitive of self-conscious emotions), including pride, shame, guilt, and jealousy. Secondary emotions require the awareness of others' perspective on your situation. For instance, experiencing shame is related to seeing oneself through the eyes of an audience, which could be real or imagined.

Historical Background

Historically, emotions are often contrasted with cognition or rationality. Over 2,000 years ago, Stoic and Epicurean philosophers even argued that emotions are damaging to humans because of their irrational nature. This perspective is still apparent in contemporary sayings like "let's be rational" or "don't get all emotional." The contrast between emotion and rationality or cognition has been debated since the writings of Aristotle and medieval rationalist philosophers to Darwin and Freud. More recently, the discussion revolved around the issue whether emotions precede cognition or vice versa. For example, during the encounter with a bear, do we become frightened because we know the animal is dangerous, or do we feel our fear and then realize the animal is dangerous? James (1884) argued that the stimulus (the bear) elicits a physical arousal

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that causes the feeling of fear. Later, Arnold (1960) argued that one infers ("appraises") that the bear is dangerous, which causes a tendency to run away resulting in the feeling of fear. Cognition precedes emotion. Subsequently, this cognitive approach to emotions was invalidated by an experiment that ingeniously showed that emotional preferences can occur without the cognitive appraisal of a stimulus (Zajonc, 1980).

Scientists are increasingly skeptical about the possibility to untangle emotional and cognitive processes. Damasio (1994) argued that the anatomy and functionality of emotions are strongly related to physical and rational processes. This perspective is widely embraced in field of affective neuroscience (Davidson, 2000). In this conception, emotions become an important drive rather than a damaging force to our rationality. One of the first to argue for the functional nature of emotions was Darwin and Ekman (1872), reflecting on the animal sources of human emotions. In line with his conception, Frijda (1986) defined emotions as states of action readiness or inborn behavioral programs, which allow flexible adaptation to a rapidly changing environment. For example, aggression can motive us to remove objects that prevent us from achieving our goals. Sadness helps us to abandon goals that are out of reach. Fear enables the body for a fight or flight response, and happiness increases cohesion and prolongs favorable situations.

Research on emotions in autism has increased dramatically during the last two decades. While the second half of the twentieth century started with an emphasis on psychoanalytical aspects of autism, much research was consequently focused on autism as an information processing disorder. While this cognitive approach led to a fruitful line of research, emotional aspects of the disorder were neglected until emotion became an important topic in psychology in the 1980s and the rise of affective neuroscience in the 1990s.

Current Knowledge

Below, a snapshot of current knowledge regarding emotions and autism is described with respect to the following broad domains: diagnostic criteria, expression, experience, perception, responding, understanding, psychophysiology, and neuroscientific findings.

Diagnostic Criteria. It is generally agreed upon that individuals with autism spectrum disorders (ASD) are characterized by abnormalities in their interaction and communication with other people and their flexibility in thought and action, all present from early childhood. Emotions play a pivotal role in the definition, the diagnostic criteria, the etiology, the development, and the possibilities for treatment in autism. Leo Kanner even defined autism as an inability to "form affective contact with people" (Kanner, 1943, p. 250). The diagnostic criteria for ASD as described in the diagnostic manual for mental disorders (DSM-IV-TR; APA, 2000), the International Classification of Diseases-10 (Sponheim, 1996), and leading assessment tools, such as the Autism Diagnostic Interview-Revised (ADI-R) (Rutter, Lecouteur, & Lord, 2003) or the Autism Diagnostic Observation Scale (ADOS) (Lord et al., 2000), all include emotional problems as a *possible* aspect of the qualitative impairments in autism. The proposed criteria for the new DSM-5, to appear in 2013, will include emotional problems as a *necessary* criteria for autism: "Deficits in social-emotional reciprocity; ranging from abnormal social approach and failure of normal back and forth conversation through reduced sharing of interests, emotions, and affect and response to total lack of initiation of social interaction."

Expression. The expression of emotions can be conceived as the first communicative action of newly born infants. From the beginning of life, expressing emotions has a strong impact on the development of social interactions and social relations. Emotional expressions evoke reactions from the social environment (e.g., a crying baby evokes caring behavior). This behavior informs others on the subjective state of an individual but also serves to maintain emotional reciprocity and attachment. Typically developing children rapidly adapt emotional expressions to their social environment. Only a few weeks after birth, they are able to modify their expression to the

responses of their environment. While the components of expressing emotions seem to be present at birth, at 4 years old, typically developing children are able to express emotions at the same level as adults. Research on the early development of emotional expression in ASD is limited because most children receive their diagnosis later. However, various studies have analyzed video material of infant period in children who were later diagnosed with ASD (Baranek, 1999). Surprisingly, the expressiveness of infants later diagnosed with ASD does not seem to differ much from typically developing comparison groups. At school ages, in particular, cognitively delayed children with ASD show more neutral and idiosyncratic emotions. They may be laughing during inappropriate situations and seem less aware of their social context. Normally, intelligent individuals with ASD (high functioning ASD, HFASD) are generally found to show adequate emotional expressions, though comparison groups showed more positive affect (Capps, Kasari, Yirmiya, & Sigman, 1993). In general, most research on emotions highlights the perception of or responses to emotional expressions by others. How individuals with ASD express their own emotions has been studied less often.

Experience. A persistent misconception on individuals with ASD is they experience less emotion than typically developing individuals. Though it is not possible to directly measure differences in experience (the qualia problem), indirect measures of behavior, retrospective, verbal, and observational outcomes indicate that individuals with ASD are highly emotional but likely express their emotions in atypical manners. One line of research has highlighted alexithymia in autism. Alexithymia refers to the inability to differentiate and describe one's own subjective feeling state. A lower awareness of one's own emotions has been reported in several studies, but there is no consensus that autism overlaps with alexithymia.

Perception. Typically developing humans show a strong preference for social stimuli from birth. During infancy, they rapidly increase in their ability to recognize human stimuli and differentiate between the emotional states of others. Evidence for impaired emotion perception skills in ASD is conflicting. Abnormal perception of emotions has particularly been shown with respect to facial stimuli. In particular, reduced attention to eye regions, poor memory, and abnormal emotion processing were shown. Impaired perception was also found in other sensory modalities, like voices or bodily gestures. However, cognitive ability and test conditions play an important role (Begeer, Koot, Rieffe, Terwogt, & Stegge, 2008). In general, given structured situations and average or above cognitive abilities, basic emotions are perceived in ASD at equal levels as comparison groups. However, cognitive delay and unstructured dynamic real-life settings generally result in less adequate, delayed processing of perceptual information. It should be noted that scientific research is often conducted under strict, standardized, and straightforward conditions, to ensure validity and reliability of findings. A strong disadvantage of this approach is that it creates an optimal situation for individuals with autism. Their capacities in the psychological laboratory may overestimate their daily life skills.

Responding. Typically developing children show reciprocal or empathic responses to others' emotions during infancy. Around their first year of life, children start to alter their behavior based on emotional responses of others. For example, they alter their approach of an object based on the emotional response of their caregiver. This shared or joint attention with another person toward a third party, which may be another object, event, or person, is associated with positive affect in typically developing children. When the child monitors the affect of another person toward a third party, this is called "social referencing." While impaired responsiveness to emotions in others is an apparent criterion of an ASD diagnosis, responding to others' emotions strongly depends on age and intelligence. Structured observations indicated that infants with ASD (with mixed IQs) were less oriented to others than control infants (Baranek, 1999; Palomo, Belinchon, & Ozonoff, 2006). While responses to other's emotions are certainly not absent in the early life of individuals with ASD,

they generally respond less empathically adequate. Their attention to negative emotions or distress in another person is generally lower, and they show less change in their own affect in response to other people's distress (Hutman et al., 2010). Measuring physiological responses seems a promising way to examine automatic responding to emotions, but results so far have not indicated cohesive impairments in ASD. Age, IQ, motivation, and the explicitness of task demands improve the performance of children with ASD. It seems particularly important to stress whether responses are based on isolated explicit requests in structured situations, which is generally the case in empirical research, or informants' observations of spontaneous behavior in unstructured situations, as generally relied on in diagnostic assessment procedures.

Emotion Regulation. Emotion regulation will be discussed as a separate entry in this encyclopedia.

Understanding. Diagnostic criteria focus on behavior rather than cognition. However, many related assessment tools such as the ADI-R (Rutter et al., 2003) or the ADOS (Lord et al., 2000) also rely on children's abilities to describe and explain emotions. This can be problematic because children's adequate understanding of emotions thus decreases the likelihood of an ASD diagnosis. Recent years have seen a vast increase in studies on the understanding of emotions in ASD. Individuals with ASD and average or above intelligence were often shown to display adequate levels of emotional understanding. The understanding of emotions in others is strongly dependent on the ability to attribute subjective states to others. This ability relies on imagination and perspective taking or theory of mind, skills that are known to be impaired or atypical in ASD. Indeed, intellectually disabled individuals with ASD fail to show an understanding of emotions beyond the simple acknowledgment of prototypical causes. Where typically developing children may gain a better understanding of emotions through experience, intellectually disabled children with ASD show little progress during the preschool years. In contrast, individuals with ASD and average of above average IQ do acquire skills to provide theoretical responses to emotions, even though their explanations can at times be idiosyncratic, superficial, or scripted. Unsurprising, their emotional understanding is often correlated to their cognitive skills (Capps et al., 1993). The understanding of mixed emotions, i.e., feeling angry and sad simultaneously, is relatively poor (Rieffe, Meerum Terwogt, & Kotronopoulou, 2007). Emotional display rules, the social guidelines for expressing behavior are generally known in school-aged children with HFASD (Begeer et al., in press), though they may be applied less. The understanding of secondary emotions like shame, embarrassment, or jealousy is poor, which is related to impaired perspective taking and poor imagination. For example, a child may feel hurt or sad when falling down, but to feel embarrassed about the situation, it needs to image how others perceive that situation. To improve diagnostic procedures of children with HFASD in particular, a strong focus on the analysis of the reasoning process that results in children's responses about emotions is necessary.

Neuroscience. With the rise of interest in affective neuroscience, the focus on brain imaging studies related to the processing of emotions took a sharp rise in autism. A coherent overview of neural underpinnings of autism is not available yet. Findings are often not integrated into a framework, and the heterogeneity of the autism spectrum complicates the search for common underlying neural mechanisms, which may in turn be diverse. To further complicate the field, inconsistent findings can also be explained by the use of different methodology. Therefore, a short overview of main topics is presented here. Brain mechanisms that are related to emotional functioning in autism are mainly studied by neuroimaging studies. Neuroimaging is a technique that can measure volume, structures, and functioning of brain areas. The neural underpinnings of emotions include systems at different levels, ranging from the regulation of core somatic circuits to regulate the interaction with others (Herbert, 2004). Anatomical abnormalities have been found in a number of brain areas that are related to emotional functioning, in particular the

cerebella and limbic systems. Links between brain activation and performance on emotional processing tasks (e.g., judging other's emotions) have been reported in autism, but the findings are not consistent. It has been suggested that individuals with ASD use different neural networks and strategies when processing emotions (Wang, Dapretto, Hariri, Sigman, & Bookheimer, 2004).

Mirror neurons. A topic that raised considerable interest is the idea that autism may be related to impairments in a "mirror neuron" system. Mirror neurons fire both when an individual executes an action and when the individual observes the same action performed by somebody else (Rizzolatti & Craighero, 2004). This may provide a system that, among other things, may facilitate the understanding of emotions in others. It has been put forward as the neural subtract of empathy (Bastiaansen, Thioux, & Keysers, 2009). Abnormal functioning of the mirror neuron system has been suggested for individuals with ASD (Hadjikhani, Joseph, Snyder, & Tager-Flusberg, 2006). However, others challenge this assumption (Fan, Decety, Yang, Liu, & Cheng, 2010), and recent findings suggest a delay rather than an impairment of mirror neurons in ASD (Bastiaansen et al., 2011).

Future Directions

Increasing the coherence of findings on many domains of research on autism and emotions is an important task for future studies. The use of large scale and longitudinal data collections, following young infants through their course of life, can provide a clearer perspective on many domains (Harms, Martin, & Wallace, 2010). In addition to these general directions, various new approaches may be worthwhile pursuing, although it should be noted that new findings often tend to be interpreted with too much enthusiasm. The focus on mirror neurons has been discussed before, and research teams around the world currently pursue this topic. More recently, the use of oxytocin, a hormone related to female reproduction, has been suggested to improve social functioning, including emotion recognition (Guastella et al., 2010), in autism. This topic is gaining considerable attention and will be on the agenda of many research groups. The use of virtual reality and other technological innovations, like robotics, to study and intervene in the emotional functioning of individuals with ASD may provide further fields of research. However, delineating which individuals with ASD are impaired on what specific domains, specifying age, IQ, and research context, in order to provide treatments that fit specific needs in specific individuals remains the main challenge for future research.

See Also

- ▶ Affective Development
- ▶ Emotion Regulation
- ▶ Emotional Intelligence

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