

Emotion Perception in Schizophrenia: Context Matters

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Abstract

Research on emotion perception in schizophrenia has focused primarily on the perception of static faces displaying different emotion signals or expressions. However, perception of emotion in daily life relies on much more than just the face. In this article, we review the role of context in emotion perception among people with and without schizophrenia. We argue that not only is context central to the perception of emotion, it in fact helps to construct the perception. Implications for future research on emotion perception are discussed.

Keywords

context, emotion, emotion perception, facial recognition, schizophrenia

Understanding social and emotional signals in the face is important for navigating daily life. Consider the following scenario: You find yourself lost in an unfamiliar city. How do you decide whom to ask for directions? You may scan the faces of passersby, looking for some signal that a particular stranger may be successfully approached and asked about directions. What are these so-called signals? Dating back to at least Darwin in *The Expression of the Emotions in Man and Animals* in 1872, an accumulated body of theory and research points to many such signals (variously referred to as emotion expressions, social signals, or nonverbal behaviors) in the face that can be reliably perceived in humans.

This research has been meaningfully translated to the study of people with schizophrenia. Indeed, researchers have studied the question of whether people with schizophrenia have a deficit in perceiving emotion displayed on the face for at least the last four decades. The first two decades of research were hindered by small sample sizes and methodological inconsistencies that made it difficult to definitively answer the question (Edwards, Jackson, & Pattison, 2002). The last two decades of research, however, have included more methodologically consistent and rigorous studies, and we can now say with greater confidence that people with schizophrenia do indeed have trouble with all types of facial emotion expression perception (Kohler, Walker, Martin, Healey, & Moberg, 2010), as well as

facial perception more generally (e.g., Kerr & Neale, 1993). Indeed, there is a debate in the field as to whether people with schizophrenia have a specific deficit in perceiving emotion in the face or a more generalized deficit in low-level sensory processes underpinning more basic perception. Unfortunately, only a handful of studies have identified emotion perception deficits using paradigms that keep sensory/perceptual aspects similar across different contextual demands (e.g., Leitman et al., 2011), thus making it more feasible to tease apart lower level deficits from higher level deficits that require integration of context with perceptual processing to make a judgment about emotion.

Facial expression perception tasks have typically taken one of two forms. In *identification* tasks, the researcher presents pictures of faces displaying different emotions (e.g., happiness, fear, surprise, disgust) and asks participants to identify the emotion being displayed, sometimes with a label provided, sometimes without. In *discrimination* tasks, the researcher presents two pictures of emotional faces side by side and asks participants if the people in the pictures are showing the same or different emotions. A recent meta-analysis of 86 studies found that people with schizophrenia have difficulty with both types of tasks (Kohler et al., 2010) compared to people without schizophrenia.

As illuminating as these findings have been, research in schizophrenia has yet to fully address the types of scenarios

more commonly encountered in daily life. First, the stimuli presented in research studies are most often comprised of prototypical emotional faces that are easier to perceive. That is, the faces are typically from sets (e.g., Ekman, 1976; Tottenham et al., 2009) of static, posed emotion expression depictions (even caricatures) that most people have had experience with (e.g., a face with furrowed brow and scowl as anger; a face with wide eyes and open mouth as fear). In daily life, however, we often confront facial signals that are more ambiguous with respect to the emotion being displayed. Second, the perception of emotion in the course of daily life requires not only the perception of emotion *per se*, but also the perception of surrounding contextual information and the integration of this information with other signals in order to make sense of what is being observed (Trope, 1986). Indeed, even perception of everyday objects relies on context (Bar, 2004). In addition, contextual information may help (or hinder) perceptions of otherwise ambiguous emotional signals on the faces (Ekman, Friesen, & Ellsworth, 1982; Trope, 1986), and this may be particularly relevant for people with schizophrenia (Phillips, Drevets, Rauch, & Lane, 2003).

What do we mean by context? Unfortunately, this word has so many varied meanings that there is a danger of losing its meaning. Many fields (e.g., linguistics, sociology, philosophy, computer science, cognitive neuroscience, psychology, pragmatics, archaeology) study contextual influences and each define the term differently. Even within schizophrenia research, context has been variously defined (e.g., Hemsley, 2005), thus making it difficult to integrate the various studies. To ground the current article's focus in contextual influences on emotion perception, we refer to Barrett, Mesquita, and Gendron (2011), who helpfully describe three types of contextual influences in emotion perception: (a) stimulus-based (e.g., social situation, visual scenes, voice or posture of the person depicting emotion on the face); (b) perceiver-based (e.g., perceivers' knowledge of emotion, such as emotion labels); and (c) culture (e.g., focus of perception varies by culture; e.g., Masuda et al., 2008). Stated differently, "Emotion perception is shaped by the external context that a face inhabits and by the internal context that exists in the mind of the perceiver during an instance of perception" (Barrett, Lindquist, & Gendron, 2007, pp. 329–330). In the remaining part of the article, we briefly review what we know about the first two types of contextual influences in emotion perception among people with and without schizophrenia.

Situation-based contextual influences on emotion perception have been studied in a variety of ways, with context manipulated via scenes, body posture, sentences, and narrative storylines. Despite the variety of contextual manipulations, all these studies find that context significantly influences the perception of neutral and emotional faces. For example, Carroll and Russell (1996) presented narrative storylines with different facial expressions of emotion and found that participants were more likely to perceive the emotion in the storyline than the emotion on the face, showing what they called "situational dominance" even when the stories were less clear in emotion content than the faces.

Another approach to investigate situational context has been to embed neutral and emotional faces in scenes that are either a match or mismatch in terms of the emotion with the faces (Koji & Fernandes, 2010; Righart & de Gelder, 2008a, 2008b). Thus, disgust faces may be embedded in a scene of garbage (a match) or happy faces may be embedded in a cemetery scene (a mismatch). Neutral faces may be embedded in a valenced (mismatch) or neutral scene (match). In general, perception accuracy is better and judgments are faster when the face and scene match compared to when they do not match, a finding that is consistent with research on contextual influence on object perception (Bar, 2004). Furthermore, neutral and emotional faces are rated differently depending upon whether they are embedded in a congruent or incongruent scene. That is, neutral and negative faces are rated more positively if embedded in a positive scene than when embedded in neutral or negative scenes, and neutral and positive faces are rated more negatively if embedded in negative scenes than when embedded in neutral or positive scenes (Koji & Fernandes, 2010).

Even if a scene is presented prior to and not concurrent with a face, it can influence the perception of a face. Specifically, neutral faces are perceived more positively if preceded by a positive scene compared to a negative or neutral scene, and are perceived more negatively if preceded by a negative scene (Mobbs et al., 2006). Similar to these findings, emotion perception is faster and more accurate when the faces are paired with congruent body postures and movement than with incongruent body language (Aviezer et al., 2008; Meeren, van Heijnsbergen, & de Gelder, 2005). Interestingly, in situations where the face and body language do not match (e.g., a sad face with fear body language), people are more likely to perceive the face as exhibiting the emotion portrayed by the body (Meeren et al., 2005). In addition, when the face and body are incongruent, people tend to scan areas of the face associated with the emotion portrayed in the body, not the face. For example, people who viewed a disgust face with anger body language spent more looking time on the upper face (associated with anger being "seen" in the eyes) than the upper and lower face (associated with disgust being seen in the eyes and mouth), but when the disgust face was paired with disgust body language, people looked more at the upper and lower face than just the upper face (Aviezer et al., 2008).

Situational influences on emotion perception are not just observed in self-report. For example, Kim et al. (2004) showed that surprise faces preceded by negative sentences (e.g., he just lost \$500.00) elicited greater amygdala activation than surprise faces preceded by positive sentences (e.g., he just won \$500). Other studies have found different event-related potentials when emotional faces are preceded by congruent versus incongruent sentences (MacNamara, Foti, & Hajcak, 2009) or when emotional faces are embedded in congruent versus incongruent scenes (Righart & de Gelder, 2008a).

Other types of contextual influences include those within the perceiver. For example, people who were in a positive mood were likely to perceive a target face as more happy when it was surrounded by happy faces than sad faces, but people in

a negative mood were likely to perceive a target face as similarly happy whether surrounded by happy or sad faces (Avramova, Stapel, & Lerouge, 2010). Another critical type of contextual information in the perceiver is words (Barrett et al., 2007). Most identification studies present participants with a list of emotion words to choose from when making a judgment about an emotion depicted on the face. In studies where words are not presented, however, people's accuracy at perceiving emotion on the face decreases (Barrett et al., 2011). Similarly, if the accessibility of emotion words is decreased (via semantic satiation), people are less accurate in perceiving facial emotion (Lindquist, Barrett, Bliss-Moreau, & Russell, 2006). Emotion words also influence perception as much as scenes, body posture, or narratives. For example, an ambiguous facial expression paired with the word fear is more likely to be remembered as fearful, but the same ambiguous face paired with the word happy is more likely to be remembered as happy (Halberstadt & Niedenthal, 2001). In a similar fashion, scenes that are paired with emotion faces are more readily recalled when participants were given emotion words to identify the emotion on the face (Barrett & Kensinger, 2010). One interesting hypothesis that flows from the studies of emotion words as context is the idea that emotion words not only create a context by activating stored conceptual knowledge about what that emotion word means, but that these words shape what we actually see (Barrett et al., 2007).

Taken together, these studies point to the centrality of context when perceiving emotion. Indeed, if the context does not match the emotion depicted in the face, perceivers are likely to be more swayed by the context than the face. To learn more about emotion perception in daily life, it is essential to consider context. By doing so, we can learn not only about emotion perception as it more typically occurs, but also about the areas in which people with schizophrenia may have particularly difficulty.

Context and Emotion Perception in Schizophrenia

As noted earlier, a good deal of research has shown that people with schizophrenia have difficulty perceiving emotion in faces (Kohler et al., 2010). Another large body of research has demonstrated that people with schizophrenia also have many deficits in context processing, broadly defined (e.g., Cohen, Barch, Carter, & Servan-Schreiber, 1999; for a review see Green, Uhlhaas, & Coltheart, 2005). Only recently, however, have studies begun to investigate how context helps or hinders the perception of emotion among people with schizophrenia. Most of these studies have examined situational contextual influences, but nearly all studies provide words as context, and a few have also assessed current mood among people with schizophrenia as they complete these tasks.

Bigelow et al. (2006) presented people with and without schizophrenia a series of photographic still scenes from movie clips that depicted groups of people interacting. One person in

the scene was identified as the target person, and scenes were presented in two conditions. In the first condition, the target face was masked, and thus the social context, as well as other non-verbal signs such as people's body posture, could provide clues as to the likely emotion. In the second condition, the target face was unmasked and matched the social context. In both conditions, participants were asked to identify what that target person was feeling from a list of seven emotion words. People with schizophrenia performed significantly worse than those without schizophrenia regardless of whether the face was masked, suggesting that the presence of the face did not help perception in the unmasked condition and more broadly, that social context did not help perception whether the facial expression was visible or not. Green, Waldron, and Coltheart (2007b) created a task to explicitly examine how situational context influenced emotion perception in schizophrenia. The Social Context Appreciation Task (SCAT) presents pictures of people expressing different emotions with and without context. Pictures of a person expressing an emotion against a clear background are presented first followed by repeated presentation of the same person but embedded in a scene that is congruent with emotion. For example, a picture of a little boy alone and crying is followed by a second picture that shows the same boy crying, but while receiving an autograph from his favorite baseball player. In studies with the SCAT, people with schizophrenia spent less time visually scanning the contextual information and were subsequently less accurate in inferring the emotional state of the scene target compared to people without schizophrenia (Green, Waldron, Simpson, & Coltheart, 2008). Interestingly, people with schizophrenia spent more time looking at the faces than controls when the faces were surrounded by contextual information. This relative lack of scanning of the contextual information among people with schizophrenia likely has consequences for daily life scenarios wherein the processing of context is helpful for interpreting emotion signals. Indeed, ratings of emotional intensity when contextual information was included did not vary as much for people with schizophrenia, especially for negative emotions such as fear and anger (Monkul et al., 2007). Another study (Green, Waldron, & Coltheart, 2007a) used the vignette task from Carroll and Russell (1996) and found that people with schizophrenia were less likely than individuals in the control group to show "situational dominance." That is, people with schizophrenia were less likely to label a facial expression with the emotion depicted in the preceding storyline, suggesting that context was not influencing their judgment of facial expressions of emotion. Taken together, these findings suggest that people with schizophrenia do not fully utilize situational contextual information in the perception of emotion.

To date, there is less information regarding the influence of verbally based contextual factors on emotion perception in schizophrenia. Huang, Chan, Lu, and Tong (2009) examined how the addition of context in the form of a preceding sentence influenced the perception of facial expressions of happiness and anger in schizophrenia. They found that emotion perception performance in the schizophrenia group did not differ across the various conversation contexts. Another study examined how the

addition of context in the form of a preceding sentence impacted the speed and accuracy of choosing the correct word to complete an ambiguous sentence (Bazin, Perruchet, Hardy-Bayle, & Feline, 2000). There was no difference in performance between people with and without schizophrenia in the condition without context (no preceding sentence), but those with schizophrenia performed significantly worse when contextual information was available. In a clever study using words as context, Leitman et al. (2011) found that people with schizophrenia were less efficient (a metric that combined accuracy and reaction time for judgments) at perceiving emotion in an incongruent context compared to a congruent context. An incongruent context was defined by a mismatch between worded task instructions (e.g., identify angry faces) and presented faces requiring a response (e.g., happy faces). Importantly, this study kept the sensory demands consistent, by presenting identical faces in differing contexts.

Although these findings are consistent with studies examining situational context, additional research into how verbal or semantic context influences emotion perception in schizophrenia is needed. Verbal contextual effects are especially intriguing given the findings of Barrett et al. (2007), which suggest the mere presence of an emotion word creates a context that may influence how an emotion is perceived. Overall, this pattern of results indicates that people with schizophrenia do not receive the facilitation, or in some cases distraction, that contextual information can provide.

Conclusion and Future Directions

Context shapes not only the way we behave, but also how we perceive the world around us. Contextual factors can include external objects like places and words as well as our own internal state. Gaining a better understanding of the link between cognitive processes, such as context processing, and emotional functioning is an important area of current research in schizophrenia (e.g., Ochsner, 2008; Ursu et al., 2011). Recently, studies of contextual processing (Kim et al., 2004) have been recommended for more study in schizophrenia (Carter et al., 2009), and these may ultimately provide important targets for intervention.

It will be important in future research to examine the third type of contextual influence, culture, outlined by Barrett et al. (2011). To date, very little research has examined cultural differences in emotion perception among people with schizophrenia, and thus it may be the case that people with schizophrenia in different cultures exhibit different patterns of emotion perception difficulties. Future research into how different types of contextual factors influence emotion perception will do well to focus on improving the generalizability of the findings. The literature reviewed in this article, while important in creating a foundation, has limited utility in the daily lives of people with schizophrenia. Efforts to understand how emotion perception is influenced by real-life social contexts will provide a more direct link between context processing, emotion perception, and social functioning more broadly. Another intriguing area of

investigation is how context impacts the experience of emotion in schizophrenia. We know that people with schizophrenia have intact in-the-moment emotional experience (for a review, see Kring & Moran, 2008), but we know less about how emotional experience can vary across situations and context, and this type of information also has important treatment implications (Gard & Kring, 2009).

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