

## A social cognitive approach to emotional intensity judgment deficits in schizophrenia

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### Abstract

Patients with schizophrenia are impaired in both emotion perception and contextual processing, however these two processes have not been thoroughly assessed simultaneously in adults with schizophrenia. This study examined the impact of social contextual information upon the perception of emotional intensity in schizophrenia. 30 clinically stable outpatients with schizophrenia and 30 demographically matched healthy subjects assessed the intensity of a single emotion (anger, disgust, happiness, sadness or fear) from images of people presented under two conditions (context-free and context embedded). During the first assessment, a single person (face and body) was presented without any background (e.g., contextual) scenery. The second assessment included the same person but with the original background of the image. Differences between the first and second ratings provided an index of the extent to which contextual information was used to judge emotional intensity. Without contextual cues, patients with schizophrenia viewed scenes as having greater disgust and anger than healthy subjects. Furthermore, patients were less impacted by contextual cues as evidenced by the minute changes in their assessments. These results suggest that patients with schizophrenia differ from healthy subjects in both their ability to rate emotional intensity and the influence of contextual adjustment upon such ratings.

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### 1. Introduction

Patients with schizophrenia have profound social functioning deficits that significantly deter attempts to

integrate these patients into the community (Velligan et al., 2006). While several groups have endeavored to improve psychosocial functioning in schizophrenia (Frommann et al., 2003; Penn and Combs, 2000; Wolwer et al., 2005), these efforts have only been moderately successful (Bellack, 2004). Good psychosocial functioning requires both adequate neuropsychological processing and intact social cognition (Couture et al., 2006). Although the documentation and remediation of formal neuropsychological deficits have received considerable

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attention (Velligan et al., 2006), far fewer studies have focused on social cognitive impairments in schizophrenia, despite evidence for their direct association with impaired social functioning (Hooker and Park, 2002; Penn et al., 1996; Mueser et al., 1996). Improved characterization of the social cognitive deficits found in schizophrenia could lead to novel psychosocial interventions, which, in turn, may improve patient outcomes. This study thus employed a novel measure of social cognition designed to dissociate emotional and contextual processing that may facilitate subsequent attempts to normalize social cognitive impairments in schizophrenia.

Social cognition includes emotion perception (as inferred from facial expressions, vocal intonations, and body language) and social processing (the ability to ascertain social cues from behavior provided in a social context) (Couture et al., 2006; Green et al., 2005). Accurate facial emotion perception thus requires attending to both target emotional and situational cues that allow one to put the expression into context, in order to facilitate the generation of an appropriate response. Considerable evidence shows that patients with schizophrenia do not fully utilize contextual information during non-social reasoning (Stratta et al., 1999) and goal-directed cognition (Cohen et al., 1999), such that a combination of these deficits may lead to the misinterpretation of emotional information, and inappropriate social responses (Adolphs, 2001; Couture et al., 2006). However, to date, the relationship between emotional perception and social context processing in schizophrenia has not been adequately studied.

Most studies of emotion perception in schizophrenia focus solely on the recognition of emotion through still photographs of facial expression (reviewed in Edwards et al., 2002; Couture et al., 2006). This approach is based on the notion that facial expressions are the most salient emotional stimuli, irrespective of other cues that present together (de Gelder et al., 2006). However, in everyday social interactions faces are interpreted within a broader context comprising whole body gestures (Meeren et al., 2005) and social cues provided in natural scenes (de Gelder et al., 2006). Thus, most prior investigations of emotion processing in schizophrenia may be limited in the sense that they lack potentially important contextual cues presented by non-facial information, and may not fully capture the difficulties experienced by patients in processing affective information within their environment.

Previous studies in healthy participants have shown that the recognition of emotions can be categorically altered from that which is usually perceived in 'universal' facial expressions (e.g., a sad face perceived as

angry), via the serial presentation of visual (e.g., other facial expressions; Tanaka-Matsumi et al., 1995) or verbal information (e.g., vignettes to establish context) prior to target face stimuli (Carroll and Russell, 1996). Other research has demonstrated the impact of simultaneously presented multi-modal (e.g., visual and auditory) information (de Gelder et al., 1999) upon facial emotion perception, alongside recent studies to delineate the time course and neuroanatomical substrates of this integrative social cognitive process (de Gelder et al., 1999; Dolan et al., 2001; Kim et al., 2004; Righart and de Gelder, 2006).

On the basis of increasing evidence that context plays an important role when making judgments about other's emotional states, recent studies have shown that reduced context processing in schizophrenia is related to impaired performance on social cognitive tasks (Penn et al., 2002). Furthermore, direct examination of the use of social contextual information in schizophrenia has recently demonstrated impaired use of both auditory (de Gelder et al., 2005; Green et al., 2007) and visually established context (Green et al., submitted for publication) to modulate categorical facial emotion judgments.

To examine the impact of visual social contextual information on judging facial expressions in schizophrenia, Green and colleagues (Green and Waldron, 2004; Green et al., submitted for publication) developed an emotion recognition task in which subjects were presented with color photographs of individuals presented under conditions of relative isolation and in the context of a realistic social situation. Contrasting ratings from the same stimuli including or excluding contextual information provided an estimate of the influence of social context on emotion judgments. In an initial study employing these stimuli, the addition of contextual information increased the consensus of emotion ratings among healthy subjects, while the performance of schizophrenia patients reflected no such pattern, in line with reduced influence of social contextual information when making emotional judgments (Green and Waldron, 2004). A subsequent investigation has demonstrated reduced visual attention to contextual elements of social scenes, associated with performance decrements in mental state judgments, compared to healthy controls (Green et al., submitted for publication).

While these initial studies demonstrate the role of context processing deficits in social cognitive performance in schizophrenia, Green's findings of reduced accuracy for categorical emotional judgments in schizophrenia may have obscured subtle effects of context during emotional judgments, due to the use of a free-choice response format. This is because patients with

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