



## Processing emotional expression and facial identity in schizophrenia

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### Abstract

Previous studies showed that schizophrenic patients have a deficit in facial information processing. The purpose of the present study was to test the abilities of patients with schizophrenia and normal controls in emotion and identity matching when these two dimensions were varied orthogonally. Subjects (20 schizophrenic patients and 20 controls) had to report if two faces had the same emotion or belonged to the same person. When the task concerned one type of information (i.e. emotion or identity), the other one was either constant (same person or same emotion) or changed (different person or different emotion). Schizophrenic patients performed worse than controls for both kinds of facial information. Their deficit was more important when the secondary factor was changed. In particular, they performed at chance level when they had to match one emotion expressed by two distinct persons. Finally, correlation analysis indicated that performance/deficit in identity and emotion matching co-varied and that in such tasks performance is negatively correlated with the severity of negative symptoms in patients. Schizophrenic patients present a generalised deficit for accessing facial information. A facial emotion and an identity-processing deficit are related to negative symptoms. Implications for face-recognition models are discussed.

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### 1. Introduction

Patients with schizophrenia show abnormal performance on facial emotion recognition and identity

matching (Cutting, 1981; Salem et al., 1996). These deficits, which affect the ability of patients to interpret others' intentions or desires, might play a role in the social disorders associated with schizophrenia.

Abnormal performance on facial emotion recognition tasks have been reported in schizophrenia (Cutting, 1981; Habel et al., 2000; Salem et al., 1996). The neural correlates of facial emotional expression are less active during emotion perception

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among patients with schizophrenia (Gur et al., 2002; Phillips et al., 1999), but performance improves after training in affect recognition (Frommann et al., 2003). The deficit could be more important for fear and sadness (Edwards et al., 2001). Some reports also indicated that this deficit extended to all facial information processing (Kerr and Neale, 1993; Archer et al., 1994; Salem et al., 1996; Franck et al., 2002; Hooker and Park, 2002), but some patients with schizophrenia seem to have greater difficulty in processing emotion-related information than other kinds of facial information (Gooding et al., 2001; Gooding and Tallent, 2002; Hooker and Park, 2002). Finally, the impairment is not restricted to facial affect but might also extend in the recognition of affective prosody (Edwards et al., 2001).

Studies of individual cases of schizophrenia have not revealed any consistent pattern of deficit: patients typically exhibit quite specific deficits, but not necessarily for the same facial information, e.g., in face recognition, emotion recognition or identity matching (Archer et al., 1994; Evangeli and Broks, 2000). Archer et al. (1994) interpreted these observations in accordance with Bruce and Young's (1986) model of face recognition. Bruce and Young (1986) proposed that there are separate functional components for the processing of facial emotion, for the processing of unfamiliar faces, and for familiar face recognition. These components are believed to be independent. This assumption is supported by experimental studies in healthy participants (Bruce, 1986; Campbell et al., 1996), electrophysiological recordings in monkeys (Hasselmo et al., 1989) and functional imaging studies (Phillips et al., 1998; Sergent et al., 1994). Neuropsychological studies (Parry et al., 1991; Humphreys et al., 1993; Schweich and Bruyer, 1993) showed that these processes could be selectively damaged (for a model of facial information processes and their neuro-anatomical correlates, see Haxby et al., 2000, 2002).

Nevertheless, some recent studies suggest that facial emotion processing and face recognition may interact (Baudouin et al., 2000a,b; Dolan et al., 1996; Schweinberger and Soukup, 1998; Tiberghien et al., 2003). For example, healthy participants were not able to pay attention to emotion when identity was varied (Schweinberger and Soukup, 1998). The experiment of Baudouin et al. (2002) extends this observation to patients suffering from schizophrenia. They observed

that schizophrenic participants could not selectively attend to facial emotion regardless of the identity displayed. The ability/deficit in classifying faces according to emotion was significantly correlated with the ability/deficit in classifying faces according to identity. Similarly, Young et al. (1996) studied a patient with a partial bilateral amygdectomy who was poor at recognizing facial emotions. She was not impaired on face-recognition and identity-matching tasks, except in the special case where she had to recognize the same person with two distinct facial emotions. Under those circumstances, she tended to perceive two different persons; the deficit in facial emotion recognition led to a deficit in identity processing.

Thus, it appears that the variation of one kind of facial information may interfere with the processing of another. Moreover, other studies reported a positive correlation in performance for emotion and identity tasks, for right brain-damaged patients (Weddell, 1989), for controls, and for lobotomized participants (Braun et al., 1994).

These observations do not favor the independence hypothesis. By contrast, they indicate that identity and emotion processing are interrelated. To reconcile these two opposing views, one may suggest that a deficit in the processing of one kind of facial information is concomitant with some decrease of the ability to process the other kind, which nevertheless does not reach an "impaired" level. This hypothesis would explain both observations of correlation and dissociation cases.

Finally, these observations suggest that the ability to respond selectively either to facial identity or emotion without interference from the other (e.g., facial expression) does not result from implementing independent processes, but rather that these processes interact and may reciprocally interfere. Thus, attention to one kind of facial information would require the intervention of active dissociation processes that allow selective responses to each kind of facial information. These attentional processes would need to be used to disregard information that is not relevant for the task.

In previous studies, each type of information was generally tested individually, i.e., participants did not need to rule out the variations of irrelevant facial information to complete the task—for example, the emotion was not varied when the task involved

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