Selective attention to facial emotion and identity in schizophrenia

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Abstract

The selective attention to facial emotion and identity was investigated in 12 patients with schizophrenia and 12 healthy participants. Both patients and controls were required to perform two classification tasks (according either to identity or emotion). Two separate values for identity (person A/person B) and for emotion (fear/anger) were used. When the classification task was on one dimension, the other dimension was either correlated, constant, or orthogonal (Garner WR. The Processing of Information and Structure. Potomac, MD: Erlbaum, 1974, Garner WR. Interaction of stimulus dimensions in concept and choice processes. Cognitive Psychology 1976;8:98–123). Results indicated that both patients and healthy participants had an asymmetrical pattern of performance: they were able to selectively attend to the identity of the face presented, regardless of the emotion expressed on the face, but variation in identity interfered with the classification of facial emotion. Moreover, a correlational study indicated that the identity interference on emotion classification for schizophrenic patients covaried with the severity of their negative symptoms. The selective attention competencies in schizophrenia and the independence hypothesis of emotion and face recognition are discussed in the framework of current face recognition models. © 2001 Elsevier Science Ltd. All rights reserved.

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1. Introduction

According to current opinion in face recognition research, the processing of facial emotion and face recognition are independent and parallel processes [17,18,46,62,63]. This postulate rests on various sources of data. The first comes from neuropsychological studies that have shown a dissociation between face recognition and facial emotion processing [61–63]. In the same way, physiological studies in primates and functional neuroimaging in humans have indicated that different parts of the brain process these two kinds of information [35,53]. Finally, several psychological studies have shown that recognition or matching of facial emotion is not influenced by face familiarity [16,19,65] and, accordingly, that recognition or matching of facial identity is not influenced by facial emotion [15,65]. Nevertheless, despite the abundance of data in favour

of the independence hypothesis, more recent findings suggest that face recognition and emotion processing interact [50].

A number of neuropsychological studies have failed to confirm the dissociation hypothesis. For example, Young, Hellawell, Van De Wal and Johnson [64] studied a patient with a partial bilateral amygdalectomy who was poor at recognising facial emotions. She was not impaired on identity tasks, except when she had to recognise the same person with two distinct emotional expressions, a situation that resulted in her perceiving the stimuli as two different individuals. Thus, the patient's deficit in facial emotion processing led to a deficit in face identity matching. Several studies have also shown that deficits in face recognition and emotion recognition correlate in many types of patients, such as patients with damage to their right hemispheres [58], right and left lobectomized patients [14], and schizophrenic patients [49]. In neuroimaging studies, the activation of the right fusiform gyrus — considered as a critical region in face recognition [36,37,55] — was

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reported as higher for smiling than neutral faces in a delayed identity matching task [21]. In the same way, the activation of primary visual areas and the amygdala decreased when the faces were familiar rather than unknown, during a task that did not require the processing of identity and familiarity, but of another type of facial information, i.e. gender [23]. Finally, some psychological studies have also indicated interactions between face recognition and facial emotion processing. Notably, smiling increased the feeling of familiarity with familiar and unfamiliar faces [8] whereas familiarity of faces favoured the processing of emotional information [9]. In other studies, facial identity variations were found to interfere with facial emotion classification tasks [51,52]. Thus, identity and emotion are extracted with the help of distinct processes located in separate cerebral areas; however, interactions may occur between these brain regions.

An implication of the independence hypothesis is that healthy participants — as well as patients — are expected to be able to pay selective attentive to one dimension without any interference from the other. This hypothesis was proposed and partially validated by Etcoff [24] with the Garner paradigm [31,32]: a paradigm that was specifically designed to test selective attention abilities. The photographs of two persons with two different facial emotions were used in a task in which it was necessary to classify either identity or emotion. When the classification was on one dimension, the second dimension was correlated (e.g. a person always expressed one emotion and the second person always expressed the second emotion), constant (both persons expressed the same emotion in identity classification or both emotions were expressed by the same person in emotion classification) or orthogonal (both persons expressed the two emotions). Selective attention to one dimension implies that the variation of the second dimension does not interfere with correct classification. In other words, classification is not facilitated in the correlated condition and/or there is no interference in the orthogonal condition. Etcoff [24] observed that both healthy participants and left brain-damaged patients were able to classify faces according to their identity and their emotion without any influence from changes in the other dimension. She concluded that distinct and independent processes must be involved in perceiving identity and emotional expression. Contrary to this conclusion, right hemisphere damaged patients in this study were not able to selectively attend to emotion without interference from identity. Interestingly, however, recent studies [51,52] using this same paradigm with healthy participants, have failed to replicate Etcoff's findings [24]. On the contrary, they have reported that, whereas healthy participants were able to be selectively attentive to facial identity, classification of facial emotions depended on identity. Notably, they

observed that healthy participants took more time to classify faces according to the emotion criterion when they had to extract the emotion from identity (i.e. to recognise the same emotion in different faces). These observations suggest that a selective attention process is required to dissociate facial emotion from facial identity.

The study of facial processing abilities in schizophrenia may shed light on the role of selective attention in the processing of the different kinds of facial information. Research studies of individuals with schizophrenia have shown that these patients display an impaired ability to recognise facial emotion [20,22,27,34,41,42,45,56]. This deficit does not appear to be associated with medication (44, 49), but poor performance does seem to be related to the chronicity of illness [43,44,49]. Some other empirical studies have found that schizophrenic patients exhibit diminished observable facial expressiveness in response to emotional stimuli [12,38,40]. An initial question that arose was whether this deficit was related specifically to recognition of facial emotions or to a more generalised deficit in the processing of facial information. Whereas previous studies indicated a differential deficit in emotion processing [47,57], subsequent investigations have shown that schizophrenic patients are impaired on numerous and varied tasks involving the analysis of faces, including familiar and unfamiliar face recognition and identity matching tasks [6,13,33,39,49]. Moreover, Salem et al. [49] observed a correlation between the deficit in a facial emotion recognition task and the Benton Facial Recognition test in schizophrenia [10,11]. More recently, studies of visual scanning behaviours showed that patients have an abnormal pattern of eye movement when undertaking both facial emotion identification [54] and face recognition tasks [59]. Thus more recent studies argue in favour of a generalised deficit of face processing in schizophrenia. Nevertheless, the study of individual cases of schizophrenia has not revealed any consistent pattern of deficit. Some patients are impaired on all facial tasks, whereas others are impaired only on some or on none of these tasks [7,25]. Moreover, a study by Archer, Hay and Young [7] using dynamic video-taped faces showed that schizophrenic patients have a deficit in the arrangement analysis of internal facial features, a deficit which would be exaggerated by an inability to process movement of these facial features. Since the arrangement of internal facial features is essential for emotion processing, patients should be impaired on tasks that require this type of processing, whether or not stimuli are static or dynamic.

Two main hypotheses could explain impaired facial processing in schizophrenia: first, schizophrenic patients would possess a dysfunctional generation of the structural descriptions which normally aid in analysing iden-