

## Imitation of facial expressions in schizophrenia

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### Abstract

Diminished facial expressivity is a common feature of schizophrenia that interferes with effective interpersonal communication. This study was designed to determine if real-time visual feedback improved the ability of patients with schizophrenia to imitate and produce modeled facial expressions. Twenty patients with schizophrenia and 10 controls viewed static images of facial expressions and were asked to imitate them. Half of the images were imitated with the use of a mirror and half were imitated without the use of a mirror. In addition, we examined whether practice in imitating and producing expressions improved the ability of participants to generate facial expressions on their own, without the aid of a model or mirror. Participants' facial expressions were photographed with a digital camera and each was rated for accuracy in producing characteristic facial expressions. Patients with schizophrenia were less accurate in imitating and producing facial expressions than controls, and real-time visual feedback did not improve accuracy in either group. Preliminary findings suggest that exposure to model expressions and practice in generating these expressions can improve the accuracy of certain posed expressions in schizophrenia.

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### 1. Introduction

Disturbances of affect in schizophrenia have been recognized since the earliest descriptions of the disorder (Bleuer, 1911/1950; Kraepelin, 1919/1971). Flattened affect, inappropriate affect, and labile affect are prominent features of schizophrenia that are often used in the diagnosis of the disorder. Broadly defined, affect is an observer-rated assessment of the internal emotional or feeling state of a person. Facial expression, body posture,

voice intonation, and motor activity are observable signs used by clinicians to assess affect.

Emotional and affective disturbances also contribute to an array of interpersonal and social deficits found in schizophrenia (e.g., Mueser et al., 1996). Persons with schizophrenia are less accurate in identifying facial expressions in others and are less expressive themselves (for reviews, see Mandal et al., 1998; Pinkham et al., 2003). Facial expressions serve a crucial role in human communication. The expression on a person's face provides a wealth of information about the person, the situation, and feedback about how to respond appropriately. Expressions of anger convey a signal to modify behavior, whereas expressions of happiness can reward and maintain current behavior. In other words,

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facial expressions help to regulate one's reactions to others.

Facial expressions have been rated in schizophrenia using several objective coding methods. Facial Action Coding System (FACS; Ekman and Friesen, 1978) is a method that categorizes facial behavior based on muscular action that changes the appearance of the face. Expressions are decomposed into action units that produce the movement. Emotion Facial Action Coding System (EMFACS), a version of FACS, is used to rate action units in the face as well as the expressed emotion. The Facial Expression Coding System (FACES; described in Kring and Neale, 1996) is used to rate global aspects of expression such as intensity, frequency, and valence. Studies that have used these rating systems yield the consistent finding that facial expressivity is reduced in people with schizophrenia (Schneider et al., 1990; Berenbaum and Oltmanns, 1992; Blanchard et al., 1994; Mattes et al., 1995; Gaebel and Wolwer, 2004; Treméau et al., 2005). However, there appears to be a discrepancy between expressed emotion and self-reports of emotional experience. For instance, in the Kring and Neale (1996) study, facial expressions of patients and normal controls were videotaped as they viewed film clips with happy, sad, fearful, or neutral themes. Patients rated the content of the films as emotional as controls did, but patients displayed fewer expressions during the emotional clips. In addition, patients' physiological measures of arousal, measured by skin conductance responses, showed a greater response to films compared to the responses of controls. This incongruence between expressed emotion and self-reported emotional experience has been observed in deficit syndrome patients and in patients specifically selected on the basis of flattened affect (Berenbaum and Oltmanns, 1992; Earnst and Kring, 1999). Reduced expressions in schizophrenia do not appear to be related to medications, as evidenced by similar findings in unmedicated patients (Kring et al., 1999).

Recent treatment approaches in schizophrenia have emphasized the importance of implementing psychosocial treatments in conjunction with pharmacotherapy. Psychosocial treatments, such as social skills training (Bellack, 2004), have yielded moderate success in treating interpersonal and social deficits in schizophrenia. Yet little effort has focused on developing strategies to improve facial expressiveness in these patients. Because facial expressions comprise a key element for effective interpersonal relationships, it is important for people with schizophrenia to develop the ability to convey emotion nonverbally through facial expression.

Additionally, according to versions of the facial feedback hypothesis, facial emotion actions, or "facial efferece," can influence subjective emotional experience (for reviews, see Adelman and Zajonc, 1989; McIntosh, 1996). Thus, reduced facial expressiveness in patients could lead to aberrant modulation of internal feeling states.

This study examined the ability of schizophrenia patients and controls to imitate static images of facial expressions. Participants were asked to produce expressions in response to instructions, representing facial actions that are under voluntary or conscious control as opposed to evoked emotional expression. Such expressions, therefore, are more akin to emotional expressions that are socially regulated, and have been referred to as display rules (Ekman and Friesen, 1976).

There were two aims of this study. First, we tested whether "real-time" visual feedback would improve the ability to express emotions. Participants were asked to imitate expressions (e.g., happy, disgust, or anger) under two conditions: with and without the aid of a mirror. The target of this intervention was to generate facial expressions that accurately matched universally recognized expressions. It was expected that imitation of expressions would be more accurate with the help of a mirror. Second, we assessed whether practice in imitating expressions (with and without the mirror) would improve the ability to self-generate expressions, in the absence of the modeled expression. To assess the effects of exposure to modeled expressions, people were asked to produce expressions in response to a verbal instruction, without the aid of a modeled expression or the mirror. A test of facial expression identification was included in the study to examine the relation between recognition and expression of emotions.

## 2. Methods

### 2.1. Participants

Twenty patients (18 male, 2 female) and ten non-psychiatric controls (8 males, 2 females) participated in the study. All participants provided written informed consent prior to their participation. The patients were recruited from an outpatient Partial Hospitalization Program in the Psychiatry Service at the Washington Veterans Affairs Medical Center. The diagnosis for all patients was determined on the basis of an interview with a psychiatrist and a chart review of the patient's medical and psychiatric history. All patients met DSM-

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