



# Emotion and self in psychotic disorders: Behavioral evidence from an emotional evaluation task using verbal stimuli varying in emotional valence and self-reference



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## ABSTRACT

**Background and objectives:** Psychotic disorders are accompanied by changes in emotional and self-referential processing. This behavioral study investigates the link between emotional and self-referential processing in 21 psychotic patients with and without symptoms of disordered self-processing and 21 healthy age-matched controls during emotional evaluation of words varying in emotional valence and self-reference.

**Methods:** Emotional and neutral words related to the self of the reader (e.g., “my fear”, “my happiness”, “my books”), to the self of another person, unknown to the reader (e.g., “his fear”, “his happiness”, “his books”) or without person reference (e.g., “the fear”, “the happiness”, “the books”) had to be judged in reference to one's own feelings as positive, negative or neutral.

**Results:** Compared to healthy controls (HC) psychotic patients with symptoms of self-disorders (PwSD) showed significantly reduced valence congruent judgments in response to self-related (particularly positive and negative) words and no difference between self-, other-, and personally unreferenced positive words. These differences between PwSD and HC were also reflected in post-experimental ratings of subjective experience. Additionally, no reaction time or memory advantage for self-related or emotional words could be found in psychotic patients irrespective of the presence of self-disorders.

**Limitations:** The results may be preliminary due to the small sample sizes.

**Conclusions:** Taken together, the results argue in favor of a differentiated view regarding changes in emotional experience in psychotic disorders. They provide preliminary evidence that in psychotic disorders changes in emotion and self-processing may be related to the severity of self-disorders thought to underlie disordered thinking and feeling in psychotic patients.

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## 1. Introduction

### 1.1. Affective processing in psychotic disorders

Psychotic disorders such as schizophrenia are characterized by positive (e.g., hallucinations, delusions, disorganized thinking) and negative (e.g., anhedonia, affective flattening, avolition, alogia) symptoms as well as by cognitive impairments (Andreasen & Carpenter, 1993; van Os & Kapur, 2009). Regarding affective

processing in psychotic disorders, experimental research suggests alterations in major domains of emotion processing including perception, recognition and expression of emotions on the one hand and subjective experience of emotions on the other hand (for reviews Kring & Caponigro, 2010; Kring & Elis, 2013; Trémeau, 2006). As far as recognition and expression of emotions are concerned reduced recognition and blunted responses regarding facial expressions, speech or body movements in response to emotionally evoking laboratory or real life stimuli have been consistently reported (for review Kring & Moran, 2008). Those findings contrast with findings from studies investigating subjective experience of emotions in psychotic patients during emotional evocation in laboratory settings (for review Cohen & Minor, 2010; Kring & Moran, 2008) or during everyday life situations (Myin-Germeys &

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Delespaul, 2000). Results from these studies converge on similar or stronger experience of emotions, negative emotions in particular, in psychotic individuals compared to healthy controls. However, when asked to appraise the emotional valence of emotional stimuli, responses of psychotic individuals, in most laboratory studies, do not differ from responses of healthy controls as far as negative stimuli are concerned. Nevertheless, patients with psychotic disorders report negative emotions to positive and neutral stimuli (e.g., for meta-analysis see Cohen & Minor, 2010; Trémeau, 2006) suggesting in psychotic disorders a general negativity bias in emotional experience and in the appraisal of emotional and neutral stimuli.

Changes in emotional experience such as a negativity bias may occur in non-psychotic disorders as well, most notably in affective disorders such as depression (Watson, Clark, & Carey, 1988). However, in affective disorders a negativity bias is thought to be due to loss of pleasure and increased negative self-schemata (Beck, 1967; Watson et al., 1988), whereas in psychotic disorders changes in emotional experience may arise from different sources: first, from an inability in anticipating pleasure in response to pleasurable stimuli (Kring & Caponigro, 2010), second, from difficulties in emotion regulation (e.g., Lincoln, Hartmann, Köther, & Moritz, 2015), and third, from difficulties in relating external stimuli to the self, i.e., self-referential processing (e.g., Northoff & Bermpohl, 2004; Northoff & Lüttich, 2012; Northoff et al., 2006).

### 1.2. Self-processing in psychotic disorders

There is evidence from several studies investigating patients with schizophrenia that psychotic patients experience self-related stimuli (e.g., own voice, own movements) as being caused by others (for an overview Hur, Kwon, Lee, & Park, 2014), that they have difficulties in keeping a personal reference frame during discourse (e.g., Ditman & Kuperberg, 2010) and in the processing of personal information from a first-person perspective (e.g., Gambini, Barbieri, & Scarone, 2004). All these observations support phenomenological theoretical accounts which consider psychotic disorders such as schizophrenia, its positive as well as its negative symptoms, as primarily resulting from disordered self-processing (e.g., Sass & Parnas, 2003; Schneider, 1959; Spitzer, 1988). Phenomenologically, disordered self-processing has been associated with a loss of 'sense of self' ("diminished presence") and 'hyperreflexivity' ("hyper-alert monitoring of mental processes"), impairing the boundaries between self and non-self and contributing to changes in subjective emotional experience and in self-referential processing of external and internal information (Postmes et al., 2014; Sass & Parnas, 2003). Experientially, disordered self-processing is thought to be closely related with delusions of agency and ownership, i.e., psychotic symptoms such as thought insertion, thought withdrawal or thought broadcasting (Leube & Pauly, 2007). Notably, these symptoms have been observed across the psychotic spectrum (Raballo & Parnas, 2011).

### 1.3. Emotion and self-processing in psychotic disorders

So far, empirical support linking changes in emotional experience in psychotic disorders to changes in self-processing is almost exclusively coming from neuroscientific studies (e.g., Ebisch & Aleman, 2016; Girard, Lakatos, & Menon, 2017; Holt et al., 2011; Menon, 2011; Pauly, Kirchner, Schneider, & Habel, 2014; for an overview; Mishara et al., 2015) and concurrent meta-analytic research (e.g., Uddin, Kelly, Biswal, Castellanos, & Milham, 2009; van der Meer, Costafreda, Aleman, & David, 2010), highlighting specific brain networks such as cortical midline structures (CMS) as essential for linking in the brain emotional processing with self-

referential processing (e.g., for meta-analytic research Northoff & Bermpohl, 2004; Northoff et al., 2006).

Although a neurobiological or neurophysiological link between emotional and self-referential processing is well in line with the phenomenological models of psychosis discussed above (see 1.2.), surprisingly little evidence exists to support this relationship at the behavioral level. As outlined above (see 1.1.), previous behavioral emotion studies in psychotic patients have focused on fundamental aspects of emotion processing (i.e., perception, recognition and expression vs. subjective experience of emotions), however without controlling experimentally for altered self-referential processing. The existing behavioral studies on self-referential processing in psychotic disorder on the other hand used self-referential processing tasks, however, without systematic investigations of disorder-related changes in emotion processing and emotional experience. For instance, in two recent behavioral studies investigating self-referential processing in patients with psychotic disorders, participants were asked to rate items such as trait adjectives for self-descriptiveness and to remember these words in subsequent memory tests (e.g., Bedford & David, 2014; Holt, Lynn, & Kuperberg, 2009). These behavioral studies report in psychotic patients compared to healthy controls either increased or reduced self-referential stimulus encoding and no memory advantage for words that were referred to the self during stimulus encounter.

### 1.4. Aim of the study

The aim of the present behavioral study was to link emotional with self-referential processing in order to explore how self-referential processing affects subjective emotional experience and appraisal of emotional stimuli in psychotic disorders. To this end, stimuli were chosen in such a way that emotional stimuli varied in emotional valence and in self-reference. More specifically, neutral, positive and negative emotional nouns were presented and paired with self-referential possessive pronouns of the first person (e.g., "my fear", "my happiness", "my clothes"), other-referential possessive pronouns of the third person (e.g., "his fear", "his happiness", "his clothes") or with articles containing no person reference at all (e.g., "the fear", "the happiness", "the clothes"). To facilitate self-referential processing of these stimuli participants were asked to make valence judgments which they should base on their subjective feelings elicited during stimulus presentation. Thus, emotional processing and self-referential processing were linked at the level of stimuli and task.

The paradigm has a number of advantages compared to those emotional or self-referential processing paradigms used in previous studies (see 1.1., 1.2. and 1.3.): first, stimuli consist of written words. This makes it possible to investigate appraisal of emotional information in psychotic patients independently from disorder-related deficits in the perception or recognition of concrete socio-emotional stimuli (e.g., emotional faces or emotionally evocative pictorial scenes). Second, self-referential processing can include task-induced "reflective" top-down controlled modes of self-evaluation as well as stimulus-induced "reflexive" types of self-processing (Northoff et al., 2006). As outlined above (1.3.), so far previous studies confirmed altered self-referential processing in psychotic patients compared to healthy controls in tasks using "reflective" modes of self-evaluation. The present study investigates stimulus-driven effects („reflexive" processing) under the explicit condition of "reflective" (task-instructed) self-referential processing and examines how this affects emotional stimulus processing in psychotic patients compared to healthy controls. Third, going beyond previous studies, this design will allow the investigation of emotional processing biases in patients

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