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Review

Psychopathology and pathophysiology of the self in depression — Neuropsychiatric hypothesis

Georg Northoff *

Laboratory of Neuroimaging and Neurophilosophy, Department of Psychiatry, Otto-von-Guericke University of Magdeburg, Leipziger Strasse 44, 39120 Magdeburg, Germany

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Abstract

Background: The question of the self has intrigued philosophers and psychologists for a long time. More recently distinct concepts of self have also been suggested in neuroscience more specifically in neuroimaging.
Aims: The aim here is to apply these findings to abnormalities of the self in depression and to develop neuropsychiatric hypothesis.
Methods and results: Patients with depression suffer from an increased self-focus, attribution of negative emotions to the self, and increased cognitive processing of the own self. We assume that in major depressive disorder (MDD), the abnormal self-focus may be related to altered neural activity in the ventral cortical midline structures (CMS), the one-sided attribution of negative emotions to the self with neural activity in the amygdala and the ventral striatum/N. accumbens, and the abnormal cognitive processing of one's self with reciprocal modulation between ventral CMS and lateral prefrontal cortical regions.
Conclusions: It is concluded that the transdisciplinary investigation of the self between neuroscience, psychiatry and philosophy yields novel insights into the psychopathology and pathophysiology of the self in depression as well as into the neurophilosophical concept of the self in general.

Keywords: Self; Depression; Cortical midline structures

Contents

* Tel.: +49 391 6714234; fax: +49 391 6715223.
E-mail address: georg.northoff@medizin.uni-magdeburg.de.
URL: www.nine3.com/gnorthoff/.

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1. Introduction

The question of the self has been one of the most salient problems throughout the history of philosophy and more recently also in psychology and neuroscience (James, 1892; Panksepp, 1998; Damasio, 1999; Gallagher, 2000; Stuss et al., 2001; Gillihan and Farah, 2005; Kelley et al., 2002; Lambie and Marcel, 2002; LeDoux, 2002; Turk et al., 2003; Damasio, 2003; Gallagher and Frith, 2003; Keenan et al., 2001; Kircher and David, 2003; Panksepp, 2003; Vogeley and Fink, 2003; Northoff, 2004; Northoff and Bermpohl, 2004; Northoff et al., in press; Metzinger, 2003). The question of the self is not only of philosophical and neuroscientific interest but also highly relevant in psychiatry. Recent investigations have predominantly focused on abnormalities of the self in schizophrenia and its so-called ego-disturbances (Kircher and David, 2003). In contrast, abnormalities of the self in other psychiatric disorders have rather been neglected so far. We here want to focus on the self and its abnormalities in depression, particularly in depression. The aim of the paper is to develop predictions or hypotheses about the possible neural basis of abnormalities of the self in depression. In a first step, I want to define the concept of self making it suitable and applicable to neuroscience and psychiatry. The second step characterizes the psychopathology of the self in depression focusing on three particular characteristics, increased self-focus, attribution of negative emotions to the self, and increased cognitive processing of the own self. The third step consists in discussing recent findings in healthy subjects from predominantly imaging studies about the possible neural basis of the self. The focus is here on the neural basis of the three characteristics, self-focus, attribution of emotions to the self, and cognitive processing of one's self. In a fourth step, these findings in healthy subjects are related to current imaging studies in depression. By combining psychopathological changes in the self and imaging data from both healthy and depression, I develop neuropsychiatric hypotheses that reflect assumptions about the possible neural basis of the three characteristics of the abnormal self in depression, increased self-focus, attribution of negative emotions to the self, and increased cognitive processing of the own self. I will also discuss possible empirical study designs that may possibly allow to further explore the neural basis of the self in depression. It should be noted that due to the wide span and the transdisciplinary character of the current investigation, many intra-disciplinary details in the different sections cannot be spelled out and discussed in an appropriate detail and length. At the very end I will also discuss some implications for the neurophilosophical concept of the self, e.g., whether the self is a higher-order cognitive function, e.g., self-awareness, or rather a particular type of process of formatting and coding incoming stimuli.

2. Definition and concept of the self in neuroscience

Damasio (1999, 2003) and Panksepp (1998, 2003) suggest a "proto-self" in the sensory and motor domains, respectively, which resembles William James's description of the physical self. Similarly, what has been described as "minimal self" (Gallagher, 2000; Gallagher and Frith, 2003) or "core or mental self" (Damasio, 1999, 2003) might correspond more or less to James' concept of mental self. Finally, Damasio's (1999, 2003) "autobiographical self" and Gallagher's (2000), Gallagher and Frith's (2003) "narrative self"