



ELSEVIER

Contents lists available at ScienceDirect

# Consciousness and Cognition

journal homepage: [www.elsevier.com/locate/concog](http://www.elsevier.com/locate/concog)

## The trans-species core SELF: The emergence of active cultural and neuro-ecological agents through self-related processing within subcortical-cortical midline networks <sup>☆</sup>

Jaak Panksepp<sup>a,\*</sup>, Georg Northhoff<sup>b,1</sup>

<sup>a</sup> *Baily Endowed Chair of Animal Well-Being Science, Department of VCAPP, College of Veterinary Medicine, Washington State University, P.O. Box 646520, Pullman, WA 99164-6520, USA*

<sup>b</sup> *Department of Psychiatry, University of Magdeburg, Germany*

### ARTICLE INFO

#### Article history:

Received 18 October 2007

Available online 15 May 2008

#### Keywords:

Core-self

Brain

Ecological constraints

Emotions

Evolution

fMRI

Motivations

Self-referential processing

### ABSTRACT

The nature of “the self” has been one of the central problems in philosophy and more recently in neuroscience. This raises various questions: (i) Can we attribute a self to animals? (ii) Do animals and humans share certain aspects of their core selves, yielding a trans-species concept of self? (iii) What are the neural processes that underlie a possible trans-species concept of self? (iv) What are the developmental aspects and do they result in various levels of self-representation? Drawing on recent literature from both human and animal research, we suggest a trans-species concept of self that is based upon what has been called a “core-self” which can be described by self-related processing (SRP) as a specific mode of interaction between organism and environment. When we refer to specific neural networks, we will here refer to the underlying system as the “core-SELF.” The core-SELF provides primordial neural coordinates that represent organisms as living creatures—at the lowest level this elaborates interoceptive states along with raw emotional feelings (i.e., the intentions in action of a primordial core-SELF) while higher medial cortical levels facilitate affective-cognitive integration (yielding a fully-developed nomothetic core-self). Developmentally, SRP allows stimuli from the environment to be related and linked to organismic needs, signaled and processed within core-self structures within subcortical-cortical midline structures (SCMS) that provide the foundation for epigenetic emergence of ecologically framed, higher idiographic forms of selfhood across different individuals within a species. These functions ultimately operate as a coordinated network. We postulate that core SRP operates automatically, is deeply affective, and is developmentally and epigenetically connected to sensory-motor and higher cognitive abilities. This core-self is mediated by SCMS, embedded in visceral and instinctual representations of the body that are well integrated with basic attentional, emotional and motivational functions that are apparently shared between humans, non-human mammals, and perhaps in a proto-SELF form, other vertebrates. Such a trans-species concept of organismic coherence is thoroughly biological and affective at the lowest levels of a complex neural network, and culturally and ecologically molded at higher levels of neural processing. It allows organisms to selectively adapt to and integrate with physical and social environments. Such a

<sup>☆</sup> We dedicate this paper to the memory and seminal contributions of Paul MacLean (1913–2007), who died on December 26, 2007. His conceptualization of the limbic system as a coherent functional entity is consistent with the vision of a core-SELF that we have described here. We appreciated him as a friend, a visionary scholar and a remarkably charming and warm human being. We regret that his legacy has been tarnished by those who have trouble understanding the utility of theory and *conceptual* structures in deep neuroscience (Panksepp, 2002a, 2002b).

\* Corresponding author.

E-mail address: [jpanksepp@vetmed.wsu.edu](mailto:jpanksepp@vetmed.wsu.edu) (J. Panksepp).

<sup>1</sup> Equal contribution.

psychobiologically universal, but environmentally diversified, concept may promote novel trans-species studies of the core-self across mammalian species.

© 2008 Elsevier Inc. All rights reserved.

## 1. Introduction

Consciousness, as one of the most crucial features of human existence, is increasingly becoming a topic of neuroscientific inquiry. This forces us to reconsider what it means for humans to possess a “self.” Likewise, evolutionary perspectives coax us to entertain such issues in other organisms, for they too may possess such attributes of mentality. If we have core selves, perhaps they do also. This is rather likely since such a basic level of self may allow organisms to become spontaneously *active* organisms, able to relate intimately to the environment soon after birth. We envision the core-self to allow organisms to be active agents, as opposed to simply passive information-processing machines, as classical behaviorism and modern information-processing approaches have envisioned.

In our estimation, the most basic form of self is, at its core, relational in the sense that it constitutionally allows the selective and adaptive relation of the organisms to their environments. In this view, such a relational self, which we here call the proto-SELF (the most ancient form of coherent body representation), that provides a foundational infrastructure for the emergence of a core-SELF from which raw subjective experience and core phenomenal consciousness emerge, namely primary-process consciousness—the ability to perceive the world and to experience various raw affective states (Merker, 2007; Panksepp, 1998a, 2005a, 2005b)—upon which all other forms of consciousness may have been built in brain–mind evolution. We capitalize SELF (which can be envisioned as a Simple Ego-type Life Form, following Panksepp, 1998b) to highlight that we are referring to concrete evidence-based genetically ingrained neural networks which provide an infrastructure for the construction of higher selves. In other words the nomothetic SELF, a poorly understood genetically provided complex network infrastructure, similar across all mammalian species, is a necessary substrate upon which higher idiographic selves are epigenetically constructed. The use of capitalization has many functions, but the primary one is to highlight that we are specifying an actual brain process as opposed to a conceptual entity (Panksepp, 1998a). We will continue to use “core-self” in lower case where there is major divergence of the core-SELF into epigenetically created diversities, starting, perhaps, within medial frontal cortical regions.

Overall, our perspective is quite similar to that advocated by Merker (2007) but we focus more heavily on the affective-emotional aspects of core consciousness, while Merker focused more on primal perceptual aspects. Although our views overlap, they have emerged independently and from distinct intellectual traditions, except for the shared recognition that there was a period of neuroscience in the middle of the 20th century, demonstrating how important medial brain-stem functions were for consciousness as well as all the basic homeostatic regulations and emotional urges of animals (Denton, 2006; Merker, 2007; Panksepp, 1998a). Thus, the aim of this paper is to discuss the possible existence of an affective, nomothetic core-SELF in all mammals that may be the foundation for the diversity of higher selves—the many idiographic forms of selfhood that can emerge during development.

Probably the clearest data for the neural nature of experiential processes in animals is available from the study of basic emotional processes, where one can identify brain systems for specific emotions using localized electrical stimulation of the brain (ESB). Such artificially evoked instinctual arousals yield not only distinct emotional displays but also clear indications that animals like or dislike such brain states. These effects are obtained in homologous brain regions in all mammals studied (Panksepp, 1998a, 2005a, 2005b). This suggests that affect is a neurodynamic property of subcortical instinctual emotional arousal, concentrated in midline circuits. The fact that humans, who can provide verbal self-reports, have comparable affective feelings during such evoked states, with full felt ownership of such experiences, validates the cross-species nature of such primal emotional processes (Heath, 1996; Panksepp, 1985), although much more work needs to be done. Regrettably few are pursuing such work.

The fact that all basic emotional operating systems converge on primitive brain regions such as the periaqueductal gray (PAG), suggests how the affective foundation for a core-SELF may be constructed within the most ancient medial strata of all mammalian nervous systems (Panksepp, 1998a, 1998b). The massive interconnectivities of these medial brainstem regions to higher medial regions of frontal cortex (Holstege & Saper, 2005), brain areas implicated in self-related processing in human brain imaging work (Northoff et al., 2006), provide an integrated vision of how nomothetic core-SELF processes are constructed within the mammalian brain (Northoff & Panksepp, 2008). Further, the widespread influences of these medial cortical regions on the rest of the brain, suggest how various idiographic self processes, more widely represented throughout the rest of the neocortex, emerge in the epigenetic developmental maturation of higher regions of adult human brains and minds.

*Epigenesis* is the concept that covers all those lasting changes in gene expression profiles that are controlled by environmental inputs (e.g., via methylation of chromatin surrounding genes that control gene expression levels, as well as other distinct chemical processes such as “sexual imprinting” of genes) rather than the expression of the intrinsic information in gene nucleotide sequences. The key to higher human psychic development, including the emergence of various idiographic selves, may reside in the manner in which certain foundational evolutionarily provided tools for living (e.g., proto-SELF and core-SELF networks), along with epigenetic programming of higher brain regions by real-world experiences, engender

Download English Version:

<https://daneshyari.com/en/article/927866>

Download Persian Version:

<https://daneshyari.com/article/927866>

[Daneshyari.com](https://daneshyari.com)