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THE SENSE OF SELF: A NEUROIMAGING STUDY OF INTERACTIONS BETWEEN INTRINSIC AND EXTRINSIC SELF NETWORKS

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Grant 195/16

Background: Self concepts have been studied extensively in neuroscience and psychology to understand mind and consciousness as well as altered self-awareness phenomena. How different self concepts constitute a multidimensional sense of self is poorly understood. The intrinsic self concerns the experience of mental activity and environmental information as intrinsically related to one's own person and real-life personal context ("identity"). The extrinsic self emerges from sensorimotor interactions with the external world, like the awareness of being the source of one's own actions and consequences thereof ("agency"). Clinically, both concepts play a key role in self-experience disturbances linked with psychosis.

Aims: To test the hypothesis in a non-clinical sample that multidimensional self processing (and individual differences in its alteration) depends on the functional interactions between brain networks related to the intrinsic and extrinsic self, including the default mode network and sensorimotor networks.

Method: Functional magnetic resonance imaging (fMRI) was performed in 39 healthy adult volunteers during rest and task conditions differentiating between "self-agency" and "other-agency" (agency factor) of action consequences in "self-identity" and "other-identity" contexts (identity factor). Statistical analyses assessed: (i) Modulation of fMRI data by the identity and agency factors, particularly brain functional connectivity and neuronal network organization; (ii) Associations of behavioral/psychometric data (e.g., psychotic/schizotypal traits, sense of agency measures) with the fMRI data.

Results: Graph theoretical measures of functional connectivity patterns showed that brain modules became fragmented when self-relatedness was totally missing (in other-identity, other-agency conditions), while they formed coherent modules when at least one component of the action consequences was self-related. Moreover, individual differences in psychosis-relevant traits were associated with decreased inter-network interactions in contexts of diverging intrinsic and extrinsic self-related information.

Conclusions: The findings provide evidence that the sense of self is a multidimensional phenomenon based on integrative brain functioning through cross-network information propagation. Interactions between networks that support the maintenance of a coherent self-experience in ambiguous contexts could be diminished in individuals with high psychosis-relevant traits.

Keywords: Intrinsic self, Extrinsic self, Agency, Identity, Psychosis

Publications:

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