

## **The sense of self: A neuroimaging study of interactions between intrinsic and extrinsic self networks**

### **ABSTRACT:**

#### **Background**

It is poorly understood how the brain integrates intrinsic and extrinsic self-concepts to constitute a sense of self. It was hypothesized that the dynamic integration/segregation of functional brain networks could support a sense of self.

#### **Aims**

To investigate how intrinsic and extrinsic self-processes and related brain networks interact to constitute a sense of self, and its association with traits of altered self-experience.

#### **Method**

Behavioral and fMRI data were obtained from 39 healthy participants to provide measures of implicit intrinsic and extrinsic self-processing, and of individual psychosis-relevant traits. Using graph theoretical measures of brain functional connectivity (FC), modularity and participation indices were calculated. It was tested how FC measures (i) were modulated by different levels of intrinsic and extrinsic self-relatedness induced by the fMRI task; (ii) were associated with behavioral measures of the sense of self; (iii) were associated with psychosis-relevant traits.

#### **Results**

The results show that a functional integration of multiple brain subsystems (sensorimotor, default mode, memory, cognitive control, higher order cognition) supports both intrinsic and extrinsic self-processing. Increased levels of individual psychosis-like experiences were associated with the loss of hubness/decreased cross-network interactions when self-relatedness on multiple dimensions is incongruent.

#### **Conclusions**

The dynamic integration/segregation of brain networks involved in intrinsic and extrinsic self-processing supports a multidimensional sense of self. Higher levels of psychosis-relevant traits could be associated with diminished cross-network interactions, especially in situations of ambiguous self-relatedness.

#### **Keywords**

Intrinsic self, Extrinsic self, Psychosis, Brain networks, fMRI.

### **Published Work:**

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Di Plinio, S., Arnò, S., Perrucci, M. G., & Ebisch, S. J. (2019). Environmental control and psychosis-relevant traits modulate the prospective sense of agency in non-clinical individuals. *Consciousness and Cognition*, 73: 102776 doi: 10.1016/j.concog.2019.102776

Di Plinio, S., Perrucci, M. G., Aleman, A., & Ebisch, S. J. H. (2019). I am Me: Brain systems integrate and segregate to establish a multidimensional sense of self. *NeuroImage*, 205, Article 116284. doi: 10.1016/j.neuroimage.2019.116284

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