

# The abnormalities of functional integration in schizophrenia

## FMRI and MEG imaging are pointing to the same issues

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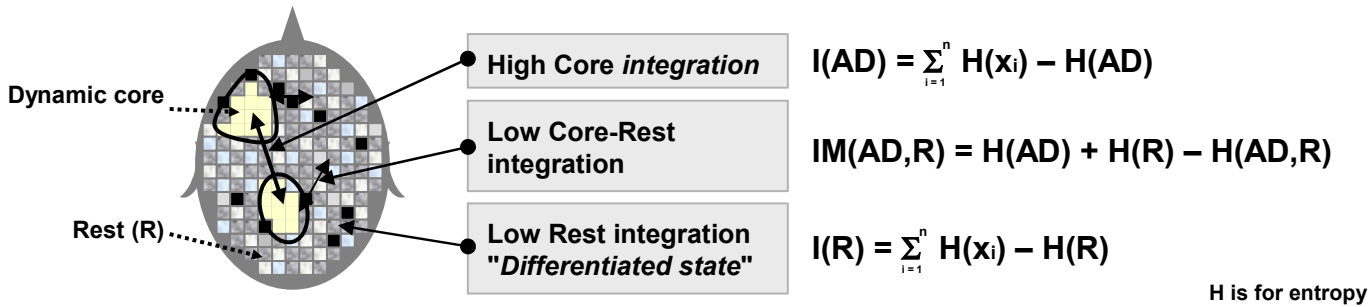
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### Introduction

The disconnectivity hypothesis proposes that schizophrenia results from poor or miswired anatomical connections. Theoretically, its functional counterpart should be disintegration. Integration is thought to allow segregated neurons to interact as a coherent whole. This can be assessed by functional connectivity between pairs of regions. But new algorithms also allow to assess integration at the whole brain level, considering that areas of coherent activity form an integrated “core”. The non-interacting part is referred to as the “rest” (fig. 1).

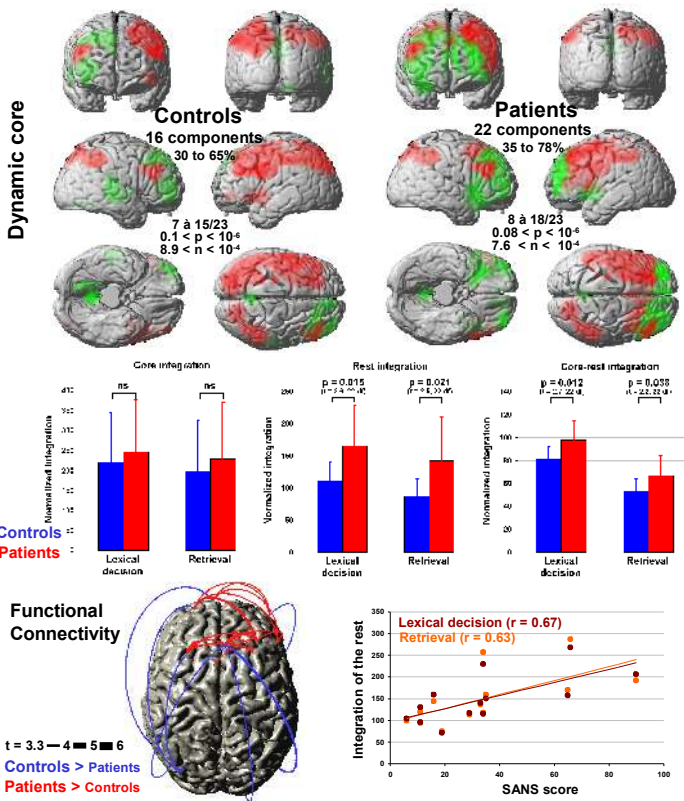
### Method

We used two fMRI studies of 13 stabilized medicated schizophrenic subjects compared to 11 matched controls. Subjects performed a lexical decision task in the first part and retrieval task in the second. Then we select a completely different imaging modality to study 6 patients and 6 matched controls with MEG. Participants were required to perform a verb generation task on semantic indices.



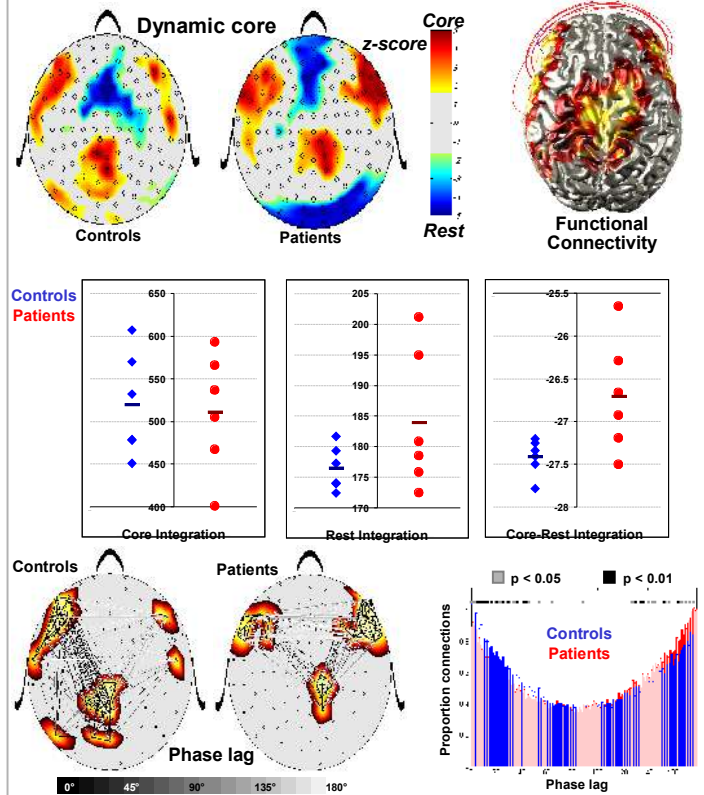
### fMRI Study

#### Lexical decision & recognition tasks



### MEG Study

#### Verb generation task



### Results

Cores did not differ from the rests, neither in terms of anatomical distribution nor of functional integration. However, the cores were badly isolated from the rests and the rests were overly integrated in schizophrenic subjects. Furthermore, within the cores, anterior-posterior correlations were defective in patients (e.g. between the frontal and the parietal cortices) whereas frontal left-right correlations were excessive. But patient's connectivity was not relying on synchrony as in controls. Correlation was absent when considering medication but was significant for negative symptoms. Results were replicated in both fMRI and in the MEG studies.

### Conclusion

Thus, schizophrenia entails a deleterious combination of too much “noisy” integration (into the rest) but also too little “significant” integration (defective anterior-posterior functional connectivity).

### References :

1- Tononi et al. *Science* 1998

2- Foucher et al. *NeuroImage* 2005