E-Letter responses to:

brevia:
Christine Esslinger, Henrik Walter, Peter Kirsch, Susanne Erk, Knut Schnell, Claudia Arnold, Leila Haddad, Daniela Mier, Carola Opitz von Boberfeld, Kyeon Raab, Stephanie H. Witt, Marcella Rietschel, Sven Cichon, and Andreas Meyer-Lindenberg
Neural Mechanisms of a Genome-Wide Supported Psychosis Variant
Science 2009; 324: 605 [Abstract] [Full text] [PDF]

E-Letters: Submit a response to this article

PUBLISHED E-LETTER RESPONSES:

Can fMRI Alone Identify Functional Connectivity in the Brain?
Camilo J. Cela-Conde, Fernando Maestu, Claudio Mirasso, Enric Munar and Marcos Nadal (16 July 2009)

Can fMRI Alone Identify Functional Connectivity in the Brain? 16 July 2009

Camilo J. Cela-Conde, Senior Professor *Institute for Cross-Disciplinary Physics and Complex Systems. UIB-CSIC, Spain*, Fernando Maestu, Claudio Mirasso, Enric Munar and Marcos Nadal

Respond to this E-Letter: Re: Can fMRI Alone Identify Functional Connectivity in the

C. Esslinger *et al*.'s Brevia ("Neural mechanisms of a genome-wide supported psychosis variant," 1 May 2009, p. 605) is an exciting step forward in the understanding of the neural mechanisms underlying psychosis. It also constitutes a valuable contribution in relation to neuronal networks: It proposes that a variant of the ZNF804A gene acts to reduce connectivity between certain brain areas.

The notion of connectivity has largely been considered by anatomists, neurologists, and psychologists to be at the core of explanations of consciousness (*1*). Since the times of Von der Malsburg (*2*), consciousness has been associated with the presumed synchronization of neuronal

Brain?

network activity. Thus, any connectivity identified between brain regions known to be relevant for specific mental processes—or their altered functioning—is of great interest for the delineation of the mind's architecture.

Esslinger *et al*.'s determination of the correlation between fMRI time series is grounded on "functional connectivity." This is a common procedure, and the authors recognize its pros and cons. However, a general, methodological question can be posed: Is the time span of fMRI records adequate to justify neural synchronization. Given that fMRI averages neural activity throughout almost a second, this time interval seems too long to deduce the presence of functional connections.

It seems that other neuroimaging techniques, such as magnetoencephalography (MEG) or electroencephalography (EEG), which have a much higher temporal resolution, could be combined with fMRI to verify actual synchronization. By using a range of milliseconds, statistical dependence between two temporal series of neuronal phases could be interpreted as evidence for functional connectivity with a higher degree of validity.

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References

1. F. Crick, C. Koch, *Semin. Neurosci*. 2, 263 (1990).

2. C. von der Malsburg, W. Schneider, *Biol. Cybern*. 54, 29 (1986).

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