EURYI Awards 2004

Press Information

Dr. Etienne KOECHLIN

– Neuroscience –

Project:

Executive Control and Functional Organization of the Human Prefrontal Cortex

The prefrontal cortex subserves executive control, i.e. the ability to activate and coordinate thoughts and actions in relation with internal goals. Our overall aim is to understand the architecture of executive control and the related functional organization of the prefrontal cortex in Humans. Using functional magnetic resonance imaging and mathematical modeling, we have recently established the functional principles underlying the antero-posterior organization of the human lateral prefrontal cortex and we have validated a mathematical model quantifying the engagement of specific forms of executive control at the levels of behavioral performance and prefrontal activations. In this project, our specific aims are: (1) to extend and validate the model to the other forms of executive control; (2) to identify the ventro-dorsal and interhemispheric organisation of the lateral prefrontal cortex underlying executive control; (3) to understand the functional interactions between the lateral prefrontal cortex and other brain structures involved in executive control, i.e. the medial and orbital prefrontal cortex, as well as posterior associative cortex and basal ganglia. The expected outcome of the project is to obtain a comprehensive, quantitative description of lateral prefrontal functions. This basic research project is expected to have major implications for understanding neuropsychiatric diseases involving the prefrontal cortex and mental alterations observed in ageing and brain-lesioned patients as well as in robotics for building artificial systems with human-like adaptive planning abilities.

Comments:

The modeling of the functioning of the brain is now among the hottest topics in integrated neuroscience. The candidate has been a major player in this field. This project will allow an integration of cellular aspects of the nervous system function, neurophysiology and theoretical aspects.

This truly brilliant individual has a proven track record of excellence in multidisciplinary approaches to cognitive functions. He is credited by world experts for having changed the direction of this major field of study.

Having established the general process of decision making, with the interplay of sequential cascade of inputs from different regions of the brain, and having derived a mathematical model which has been validated for one particular area of the brain, the candidate will now use this multidisciplinary approach to clarify other functional areas of the brain.

The host institution, particularly in view of its decision to establish a new department in cognitive sciences, is an ideal location for a candidate who requires interactions with leaders in complex disciplines.

Nationality: French
Address: INSERM U483, Room 610, Bat C, Université Pierre et Marie Curie, 9 quai St Bernard, 75005 Paris, France

Current institution: INSERM U483 Université Pierre et Marie Curie (UPMC)
New institution: INSERM, Action, NeuroImagerie & Modelisation, UPMC

Media Enquiries:

Jens Degett, ESF Communications Director
European Science Foundation, Strasbourg, France
Tel: +33 (0)3 88 76 71 32 – Fax: +33 (0)3 88 37 05 32 Email: jdegett@esf.org