B·DEBATE International Center for Scientific Debate BARCELONA

RICHARD FRACKOWIAK

CV

PARTICIPANT AT:

BRAIN HEALTH.
FROM GENES TO BEHAVIOUR, IMPROVING OUR LIVES

October, 6th-7th, 2015, Barcelona

Richard Frackowiak, Professor at the Ecole Polytechnique Fédérale de Lausanne, Switzerland

Richard Frackowiak holds a titular professorship at the Ecole Polytechnique Fédérale de Lausanne. He is a director of the EU's "Human Brain Project" responsible for medical informatics. A pioneer of human brain imaging research he developed methods and applied them to investigate human brain structure and function relationships in health and disease. Currently he is pioneering collaboration between modern informatics and brain medicine in the HBP. His scientific output is highly cited with an h-index of 161. He has received the Ipsen, Wilhelm Feldberg and Klaus Joachim Zulch prizes. Formerly Foundation Professor of Cognitive Neurology at University College London (UCL), Director of the Department of Cognitive Studies (DEC) at the Ecole Normale Supérieure in Paris, Wellcome Trust Principal Clinical Research Fellow, Vice-Provost of UCL and Dean-Director of its Institute of Neurology, he also founded the Wellcome Department of Imaging Neuroscience and the FIL in 1994 where he is now an honorary professor. He finished his career in Lausanne where he created and headed the Department of Clinical Neurosciences at the Université de Lausanne (UNIL) and its Centre Hospitalier Universitaire Vaudois (CHUV) where he retains honorary appointments. Frackowiak has an MA and MD from Cambridge (Peterhouse), a DSc from London University, an honorary medical doctorate from Liege University. A Fellow of the Academies of Medical Sciences of the UK, France and Belgium, he is a member of the Academia Europaea and a foreign associate of the Institute of Medicine of the American Academies of Science and the Polish Academy of Sciences. He has served as president of the British Neuroscience Association and the European Brain and Behaviour Society and belongs to numerous national and European neurological societies. He was scientific advisor to the Director-General of INSERM in France and has held prestigious visiting professorships internationally, editorships and international society roles worldwide. He has always shown a commitment to Europe and had many advisory positions including chair of the Medical Sciences committee of Science Europe.

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ABSTRACT

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The Human Brain Project - The Impact of Informatics on Treatment of Brain Diseases

We now know that a single human gene mutation may present with any of multiple phenotypes, and vice versa, that a range of genetic abnormalities may cause a single disease phenotype. These observations lead to the conclusion that a deeper understanding is needed of the way changes at one spatial or temporal level of brain organisation integrate and translate into others, eventually resulting in behaviour and cognition or their abnormalities. The basic idea is that it is now possible to look for rules underlying the functional and structural organisation of the human brain, exhaustively, at all spatial scales, and eventually perhaps at all spatio-temporal scales. The methodological approach is to federate and integrate existing knowledge from bottom up using recent advances in information technologies, notably supercomputing and distributed and interactive data basing. The theory is that rules and constraints determining a particular structural and functional organisation at one level will limit what organisations are possible at the next. It has, for example, been shown that one can construct in silico models that look and behave remarkably like their ex vivo counterparts, up to the level of the cortical column. The ambition therefore is to link genetic and proteomic levels by determining the rules that govern the segregation of protein expression. From protein expression we can start to extract rules that determine cellular morphology, which in turn predicts connectivity, and so on, until the mechanisms of emergent properties are discovered by a constructive process of predictive simulation, not as isolated modules but as interacting biological entities. The HBP's goal is to generate a draft blueprint that describes how the brain is constructed across all levels. The blueprint will provide a framework within which new and old theories can be tested and new hypotheses generated. I will also touch on the implications of this novel approach for the classification and treatment of brain diseases.

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