

PRESS RELEASE

EMBARGOED UNTIL TUESDAY 15 JULY, 10.00 CEST (09.00 BST)

**SYNTHETIC INTELLIGENCE, HUMANITIES AND
PSYCHIATRY HELP SCIENTISTS UNDERSTAND THE HUMAN
BRAIN**

Today's neuroscientists need more than laboratory skills to discover how the brain works. Professor Judy Illes from the University of British Columbia describes the 'critical challenges' that the ethics of neuroscience – neuroethics – presents.

"These aspects involve every aspect of human life," she said today (Tuesday 15 July) at Europe's major neuroscience conference in Geneva. New technology, particularly brain imaging, has the potential to predict not only neurodegenerative diseases, but to delve into our thoughts and reveal patterns of behaviour.

Whilst brain imaging is a powerful tool in research, medicine and surgery, its use in, say, the law courts to prove a criminal's intentions are very much more controversial.

The concept of neuroethics has captured the imagination of the media, and more than ever before, the public are the stakeholders in how the new knowledge of the brain is applied, in government and industry, education and law, philosophy and religion.

Professor Illes, a founder of the Neuroethics Society in 2006, said, "Neuroscientists, regardless of their field of research, must familiarise themselves with the potential application of their discoveries. The excitement of neuroscience is its fast pace. There are some fantastic opportunities right ahead of us, but we must not ignore some of the dangers of misuse that run in parallel."

PRESS-OFFICE
PALEXPO, GENEVA
Bureau 3, 12 – 16 July only
Tel: +41 (0) 22 761 25 10
Fax: +41 (0) 22 761 25 11

BEFORE AND AFTER FENS:
**International/
English language**
Elaine Snell
Snell Communications Ltd
London UK
Tel: +44 (0)20 7738 0424
Fax: +44 (0)20 7978 4494
elaine@snell-
communications.net

**Schweiz , Österreich,
Deutschland**
Barbara Ritzert
ProScience Communications
Andechser Weg 17
D-82343 Pöcking
Fon: +49-(0)8157-93970
Fax: +49-(0)8157-939797
ritzert@proscience-com.de

Understanding consciousness is a holy grail of brain research. Only now can neurobiology and Freud's theories of psychoanalysis be combined to begin to describe the unconscious psychic life unique to each one of us. "Every experience leaves a trace which leads to the memories that inform our actions and behaviour, recreating a new set of traces," said Professor Pierre Magistretti from the University of Lausanne.

During our lifetime, the traces generate millions of neural networks that produce changes in the brain, a process known as plasticity. "The accumulation and interaction of these traces create in our internal world, the scenarios upon which we base our lives and make us who we are," said Professor Magistretti. Thus the phenomenon of plasticity is the point at which neuroscience and psychoanalysis meet.

Greater collaboration between neuroscience and the humanities will also lead to a better understanding of the multiple facets of the neural correlates of consciousness. Professor Jean-Pierre Changeux from the Institute Pasteur in Paris thinks this approach may move, one day, towards a 'neuroscience of the capable person,' defined as a rational individual engaged in social relationships with a personal identity.

Biologically, the complexity of the human brain has evolved anatomically at a much faster pace than that of the genomic organisation responsible for those changes. "The so-called 'epigenetic envelope' controls the division, migration and the differentiation of nerve cells of the human brain but with the capacity to develop variable neural networks that open the brain to the rich cultural diversity we enjoy today," he explained. The evolution of consciousness itself correlates with the expansion of the prefrontal cortex through long range neuronal networks that give access to the sense of self, personal memories, internalised rules and social conventions.

In the meantime, however, neuroscience has not yet got a proper grasp on cognition which slows down progress in the development of information systems that are able to think, learn and solve problems. Yet the past three decades has been dominated by the Information Age upon which the global economy relies. Neuroscience is seen in context with health and disease, while computer sciences are inadequate in the design of intelligent technology.

“The two fields only follow their own understanding of the world,” said Professor Rodney Douglas from the Institute of Neuroinformatics in Zurich. “Computer scientists who are interested in the abstract nature of cognition need to get together with biologists who appreciate the clearly defined parameters of the machine. Then they need to learn a common language.” All knowledge comes from the biological brain, so the challenge, he believes, is to bring the same intrinsic creativity into machines.

The results would be empowering. The interaction between brain and machine is clumsy - and often frustrating. Technology and the ability to exploit it could be transformed if, for instance, the workings mobile phone or the car could be synchronised with the nervous system.

Understanding the brain, therefore, demands a visionary approach to neuroscience that embraces other disciplines as diverse as humanities, synthetic intelligence and psychiatry, alongside close monitoring of the ethical implications of the progress made.

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ABSTRACTS A067.1, A067.2, A067.3, A067.4

Notes to Editors

FENS 2008 is hosted by the Swiss Society for Neuroscience and will attract over 5,000 international delegates. The Federation of European Neuroscience Societies, founded in 1998, aims to advance research and education in neuroscience, representing neuroscience research in the European Commission and other granting bodies. FENS is the European partner of the American Society for Neuroscience. FENS represents a large number of national European neuroscience societies and has around 16000 members. <http://fens2008.neurosciences.asso.fr/>