

## **Three European scientists share the world's largest prize for brain research**

### **The Brain Prize - Denmark's 1 million euro brain research prize - is awarded to three European scientists for their pioneering research on higher brain functions**

The prizewinners, **Stanislas Dehaene**, **Giacomo Rizzolatti** and **Trevor Robbins**, from France, Italy and the UK respectively, were announced on Monday, 10 March 2014 in Copenhagen.

The three scientists have provided extraordinary insights into reading skills, mathematical ability, motivations for behaviour, and social interaction. They are renowned for their efforts to translate knowledge from basic research to greater understanding of human cognitive and behavioural disorders and their treatments. Each of the researchers has made ground-breaking discoveries of complex mechanisms relevant to education, mental health, and social interaction.

British professor Colin Blakemore, chairman of the Foundation's selection committee, says: *These three scientists are internationally recognised for the scale and outstanding quality of their work in the difficult field of human cognition and behaviour. They each have made unique and lasting contributions that have motivated the interests and efforts of many other researchers around the world. All three have made particular efforts to move from basic research to clinical application – in cognitive development, mental health, addiction, brain damage and delayed learning.*

#### **From numbers to consciousness**

Through prominent research on patients with brain damage and by observation and brain imaging of humans, *Stanislas Dehaene* discovered that skills of subtraction and multiplication involve separate networks in the brain. He has uncovered the neural mechanisms of perception of letters and words as well as the origins of reading disorders produced by brain damage. He also developed ingenious methods of showing that the conscious awareness of a sensory event is linked to activity in a specific network of regions in the frontal and parietal cortices. Dehaene has invented software for treatment of children with learning difficulties in mathematics and a test of remaining awareness in patients in different stages of coma.

#### **Mirror neurons and social cognition**

*Giacomo Rizzolatti* and his colleagues made the seminal discovery of 'mirror neurons' in regions of the frontal and parietal lobes in monkeys. These neurons are active either when an animal performs a particular movement or when it sees (or hears) another animal making the same movement. Rizzolatti argued that mirror neurons are fundamental to the understanding of goals and intentions of others. He and his collaborators used specific techniques to obtain evidence that mirror neurons also exist in the human brain. The discovery of mirror neurons has energised the new field of social neuroscience and has raised the understanding of autism spectrum disorders.

#### **The basis for addiction, ADHD and OCD**

In his highly regarded work on cognitive disorders, *Trevor Robbins* has used pharmacological, anatomical and behavioural methods to model the regulation of behaviour in animals. He showed that abuse of drugs depends on habit formation, not simply on disruption of reward and pleasure mechanisms in the brain. He demonstrated specific circuits in the forebrain that regulate the formation of habits and addiction to drugs, and he also showed how disturbances of this circuitry can lead to Attention Deficit Hyperactivity Disorder and Obsessive Compulsive Disorder. Robbins has a strong commitment to translational research and played a key role in the invention of the CANTAB computerised battery of psychological tests, in wide use for clinical assessment of cognitive disorders.

#### **Honouring complementary research efforts**

The Brain Prize is awarded by the Grete Lundbeck European Brain Research Prize Foundation. The Brain Prize is the world's largest prize for brain research and is now being awarded for the fourth time.

Chairman of the Foundation's board, Professor Povl Krogsgaard-Larsen, says:

*We are proud to honour these three scientists with the 2014 Brain Prize. Their research interests span a wide spectrum of challenging issues of higher brain function. The three prize winners complement each*

*other; together, they constitute a forceful trio. We are pleased to award this year's prize to scientists who are providing us with a better understanding and better treatment of cognitive and behavioural diseases that are huge burdens to society. This is the fourth consecutive award of the Brain Prize since 2011 and it demonstrates the range of the Foundation's outreach. We are confident that Danish neuroscientists will gain enormously from working with the prize winners.*

The three scientists all come to Denmark to receive the shared prize of 1 million euros at a ceremony on 1 May.

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**Facts**

- The Brain Prize of 1 million euros is awarded by the independent, charitable, non-profit Grete Lundbeck European Brain Research Prize Foundation.
- The Prize is awarded for the fourth consecutive year and this year is awarded for pioneering research on higher brain mechanisms underpinning such complex human functions as literacy, numeracy, motivated behaviour and social cognition, and for efforts to understand cognitive and behavioural disorders.
- The Brain Prize is a personal prize, awarded to one or more scientists who have distinguished themselves by an outstanding contribution to European brain research.
- The Prize will be presented by HRH The Crown Princess on 1 May in Copenhagen

**ABOUT COGNITIVE AND BEHAVIOURAL RESEARCH:**

Research in cognition and behaviour aims at understanding higher human brain functions, including literacy, numeracy, thought, language, social interaction, empathy and complex motivated behaviours. Research in this area is particularly important due to the fact that disorders of cognitive development, including (ADHD), developmental dyslexia, deficits in the development of mathematical ability (dyscalculia), and autism spectrum disorders, place a huge burden on society and on educational institutions. Damage to the brain later in life often also results in disorders of language (aphasia), reading (dyslexia) and mathematics (acalculia) as well as attention deficits. Research on cognition and behaviour remains extremely challenging, demanding the synthesis of evidence from brain imaging and behavioural studies in normal humans and clinical patients, relevant work on animals, and mathematical and computational modelling.

**THE PRIZEWINNERS**

**Stanislas Dehaene** (48) is a professor at the Collège de France in Paris and director of the Inserm-CEA Cognitive Neuroimaging Unit at Gif-sur-Yvette. He originally studied mathematics and computer science but his interests have since focused on cognitive neuroscience.

**Giacomo Rizzolatti** (76) was born in Kiev, Ukraine, and he studied medicine, specializing in neurology, at the University of Parma. He spent three years at the Institute of Physiology in Pisa and two years in North America but the rest of his career has been spent at the University of Parma.

**Trevor Robbins** (64) is head of the Department of Experimental Psychology at the University of Cambridge where he completed his undergraduate degree and his PhD. He worked briefly at Harvard Medical School and at the Salk Institute, but he has spent the rest of his career at Cambridge.