Press information
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Sight and perception

German Research Ministry grants Tübingen's Bernstein Centre eight million euros to study sensory perception

All you see is a grey, round-edged piece of plastic sticking out from underneath the newspaper – yet you still know at once that you have found your mobile phone. The brain compares the sensory information supplied by our eyes with everything we know from experience and can thus complete the missing information without any trouble. In a complex processing operation it combines our prior knowledge about the world's physical appearance with the signals it receives. Scientists at Tübingen's newly-founded Bernstein Centre for Computational Neuroscience are keen to find out how these brain processes work. The centre benefits from the expertise of scientists from the Max Planck Institute for Biological Cybernetics and the University of Tübingen, including the University Hospital Tübingen, the Werner Reichardt Centre for Integrative Neuroscience (CIN), and the Hertie Institute for Clinical Brain Research. The Federal Ministry of Education and Research (BMBF) is supporting the centre with an eight million euro grant.

The new research centre is part of the nationwide Bernstein Network for Computational Neuroscience, established in 2004 and now including approximately 200 research groups at 20 different locations. The coordinator of the Tübingen Bernstein Centre is Matthias Bethge, CIN Professor and scientist at the Institute for Theoretical Physics at the University of Tübingen and at the Max Planck Institute for Biological Cybernetics. Bethge was awarded the renowned "Bernstein Prize for Computational Neuroscience" in 2006 and has been a member of the national Bernstein Network ever since.

"Perceptual inference" is what scientists call the brain's ability to combine sensory information and prior knowledge to form a coherent percept of our environment. The researchers in Tübingen are studying how the complex interplay of numerous cells in the brain manages to achieve this feat. What prior knowledge is needed to understand the world we see? How does this knowledge affect our sensory perception? How is prior knowledge stored in the brain and subsequently recalled? "The fact that our brain can solve such problems with apparent ease is all the more remarkable when you think that, even today, no one has yet managed to come up with computer algorithms that come anywhere near achieving such feats," says Bethge.

The Tübingen-based scientists focus mainly on visual perception, but they also want to understand how the different sensory systems work together to form a realistic picture of our environment.

In an attempt to solve the riddle that is sensory perception, the scientists employ innovative experimental techniques that enable them to measure the activity of large groups of neurons simultaneously and with great precision. Building on theoretical studies and applying new methods of data analysis, they are using these techniques to decode the fundamental principles of neural coding and the inference processes. Moreover, a deeper understanding of how our brain generates a coherent perception of our environment will open up the potential for new clinical and technological applications, for instance in the field of machine vision or in the development and improvement of sensory neural prostheses.

More information:

http://bccn-tuebingen.de/index.html

http://www.cin.uni-tuebingen.de

http://www.cin.uni-tuebingen.de/research/research-groups/computational-neuroscience-bethge.php