

Press Release

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UKE Publication in Renowned Journal *Nature*

Cognitive Causes of Decision-Making: The Winner Takes it All

Which cognitive processes occur in the brain when we make a decision? Researchers at the University Medical Center Hamburg-Eppendorf (UKE) and scientists of Harvard Medical School and Boston Children's Hospital have pursued this question together. The researchers were able to show that a kind of neuronal clash takes place in the area of the cortex responsible for decision-making. Of the neurons activated in the course of decision-making, those with the strongest electric activity prevail, switching off the neurons that have weaker signalling. The researchers have published their study findings in the specialist journal *Nature*.

If an imminent decision is to be made in the posterior parietal cortex (PPC), specific neuron groups send electric signals that are each supposed to signal different decision options. On the basis of the experimental examination of direction selectivity in a virtual maze, the scientists demonstrated that each neuron gathers information for direction selectivity through external visual input that indicates, for example, whether turning left or right is the better option. The evidence for a decision processed by the neurons is directly connected to their activity: The neurons that carry best evidence for a decision develop stronger electric activity and prevail by inhibiting or deactivating the electrically weaker neurons. In this way, the input individually gathered by the neurons is transferred to the level of a cortical circuit and amplified in favour of positive decision-making.

“The ability to make good decisions belongs to the basic cognitive challenges that we must master in everyday life. With our study, we were able to prove for the first time that winner-takes-all-processes form the basis of our decision-making in the responsible brain region,” says Prof. Dr. Stefano Panzeri, UKE Study Director and Director of the Institute for Neural Information Processing at the UKE.

Literature

Kuan, Bondanelli, Driscoll et al. Synaptic wiring motifs in posterior parietal cortex support decision-making. *Nature*. 2024. DOI: doi.org/10.1038/s41586-024-07088-7

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The Medical Center Hamburg-Eppendorf (UKE)

Since its foundation in 1889, the Medical Center Hamburg-Eppendorf (UKE) has been one of the leading clinics in Europe. With about 14,900 employees, the UKE is one of the largest employers in the Free and Hanseatic City of Hamburg. The UKE treats about 543,000 patients a year, 89,000 of whom are inpatients and 454,000 are outpatients. The emphasis in UKE's research are the neurosciences, cardio-vascular research, care research, oncology, as well as infections and inflammations. The UKE educates about 3,400 medical specialists, dentists and midwives.

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