

Arithmetic

Arithmetic is a cornerstone of scientifically and technologically advanced human culture, but its neuronal mechanisms are poorly understood. Calculating with numbers requires temporary maintenance and manipulation of numerical information according to arithmetic rules. We explored the brain mechanisms involved in simple arithmetic operations by recording single-neuron activity from the medial temporal lobe of human subjects performing additions and subtractions. We found abstract and notation-independent codes for addition and subtraction in neuronal populations. The neuronal codes of arithmetic in different brain areas differed drastically. Decoders applied to time-resolved recordings demonstrate a static code in hippocampus based on persistently rule-selective neurons, in contrast to a dynamic code in parahippocampal cortex originating from neurons carrying rapidly changing rule information. The implementation of abstract arithmetic codes suggests different cognitive functions for medial temporal lobe regions in arithmetic ¹⁾.

¹⁾

Kutter EF, Boström J, Elger CE, Nieder A, Mormann F. Neuronal codes for arithmetic rule processing in the human brain. *Curr Biol*. 2022 Feb 9;S0960-9822(22)00116-6. doi: 10.1016/j.cub.2022.01.054. Epub ahead of print. PMID: 35167806.

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