University of Zurich[UZH]

Department of Economics – Neuroeconomics Seminar

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A vision of (numerical) cognition: neural mechanism of numerosity

Numerosity, the set size of a group of items, helps guide behaviour and decisions. Using ultra-high field MRI at 7T and population receptive field modelling, we have described neural populations responding to specific numerosities organized in systematic topographic maps, analogous to primary sensory and motor cortical maps. These numerosity maps extend topographic principles to higher-order features in association cortex.

Besides topographic principles, we found that many principles that are well-established in vision extend to the field of numerical cognition. We will also show why the reconstruction of these maps, and cognitive neuroscience in general, needs 7T MRI. Further experiments demonstrate that these topographic representations extend to object size-tuned responses that are associated in overlapping maps. In addition, while perceptions of small and large numerosities differ in many aspects, they both elicit responses in the same numerosity maps. Overall this suggests that these maps may form a generalized quantity representation.