Circuits Club Berlin

14th February 2019

Mathew Diamond (SISSA):

Neuronal algorithms for extracting multiple percepts from a single stimulus

When neuroscientists contemplate the coding of a tactile stimulus, it is natural for us to focus first on how the evoked neuronal activity underlies the perception of stimulus features. But a second percept accompanies the tactile experience – the feeling of time occupied by that stimulus. Logically, the “raw material” for both percepts must be the neuronal representation of the stimulus itself, and from this representation further streams of processing must lead to distinct percepts. We carried out psychophysical experiments in which human subjects and rats judged, on each trial, either the intensity of a vibration or the duration of a vibration. All subjects (both species) showed an interaction between the two percepts: a longer vibration feels stronger in intensity, and stronger feels longer. Further exploration of the interaction between the intensity and duration percepts allowed us to construct a computational framework whereby the vibration-evoked firing early in the processing stream is accumulated by two integrators, in parallel, each integrator giving rise to a distinct percept. Neuronal data from behaving rats seem to support this framework.