

Single-neuron interactions in the thalamo-cortical network during somatosensory perception

Adrià Tauste, UPF

E-mail address: adria.tauste@gmail.com.

Sensory thalamo-cortical interactions are key components of the neuronal circuits associated with stimulus perception, but they are still poorly understood. We addressed this problem by evaluating a directional measure between simultaneously recorded neurons from somatosensory thalamus (VPL) and somatosensory cortex (S1) sharing the same cutaneous receptive field, while monkeys judged the presence or absence of a tactile stimulus. During the stimulus-presence, feedforward (VPL \rightarrow S1) interactions increased, while pure feedback (S1 \rightarrow VPL) interactions were unaffected. Remarkably, bidirectional interactions (VPL \leftrightarrow S1) emerged with high stimulus amplitude, establishing a functional thalamo-cortical loop. Furthermore, feedforward interactions were modulated by task context and error trials. Additionally, significant stimulus modulations were found on intracortical (S1 \rightarrow S1) interactions, but not on intra-thalamic (VPL \rightarrow VPL) interactions. Thus, these results show the directionality of the information flow between the thalamo-cortical circuits during tactile perception. We suggest that these interactions may contribute to stimulus perception during the detection task used here.

This is a joint work with Yuriria Vázquez, Manuel Álvarez, Antonio Zainos, Román Rossi-Pool, Gustavo Deco, and Ranulfo Romo.