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# An active whisker-dependent task to seek neuronal signatures of tactile sensory prediction in the mouse sensorimotor cortex

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## Abstract

Cortical circuits are thought to be involved in the computation of an internal model of our interactions with the environment. According to predictive coding theories, in case of mismatch between expected and actual sensory inputs, an error signal is generated, which is key to update the internal model and adjust the motor commands, thus optimising behaviour. To study the predictive mechanisms involved in tactile sensory perception, we designed a new tactile sensorimotor task in which head-fixed mice are trained to contact several times two fixed objects back-and-forth with a spared single whisker (C2) to obtain a reward. Then, during sessions performed with expert animals, we randomly interleave ‘omission’ trials, in which the object is removed between two whisks, creating a deviance between expected and received tactile inputs.

To reveal the neuronal correlates of such predictive mechanisms at mesoscopic scale, we perform voltage sensitive dye (VSD) imaging during the task over the somatosensory-motor cortical areas.

**Keywords:** Tactile sensory prediction, Active whisking, Sensorimotor cortex, Voltage, sensitive dye imaging

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