

Emergence of deviance detection along the auditory neuroaxis and beyond: A neuronal correlate for predictive coding?

Manuel S. Malmierca^{1,2,3}

¹Auditory Neuroscience Laboratory, Institute of Neuroscience of Castilla y León, University of Salamanca, Salamanca 37007, Spain.

²Department of Cell Biology and Pathology, Faculty of Medicine, University of Salamanca, Campus Miguel de Unamuno, 37007, Salamanca, Spain.

³The Salamanca Institute for Biomedical Research (IBSAL), Salamanca, Spain.

e-mail: msm@usal.es

Abstract:

Stimulus-specific adaptation (SSA) is the reduction in the responses to a common sound relative to the same sound when rare and was originally described in the primary auditory cortex as the neuronal correlate of the mismatch negativity (MMN). The neural sources of MMN have been located mainly within non-primary auditory cortex in humans and animal models. Moreover, SSA is also present as early as in the auditory midbrain and thalamus (IC and MGB).

In this talk, I will show our recent findings on recordings from single neurons in the IC, MGB and auditory cortex (AC) of anaesthetized rats and awake mouse to an *oddball* paradigm similar to that used for MMN studies. Our data demonstrate that most neurons in the non-lemnical divisions of the auditory brain show strong SSA and that there is a hierarchical emergence of prediction error signals along the central auditory system.

Taken together our results unify three coexisting views of perceptual deviance detection at different levels of description: neuronal physiology, cognitive neuroscience and the theoretical predictive coding framework.

Support by the Spanish MINECO (SAF2016-75803-P), and the EU Horizon 2020 Research and innovation programme under the MSCA-ITN grant-agreement No-72209.