



Introductory Remarks to Symposium 20

Subcortico-cortical loops and their role in sensory processing and perception

Livia de Hoz and Julio Hechavarria, Berlin and Frankfurt/Main

In everyday situations, animals are exposed to a myriad of sensory stimuli and yet, only a small subset of these stimuli receive conscious attention at any given point in time. This fact already hints towards two very different processes taking place in the brain: one that represents all available sensory stimuli and their precise spatiotemporal patterns; another that works on a small subset of selected stimuli in order to, for example, determine an adequate behavioral response. While the second process depends on and complements the first, the two processes are fundamentally different in nature. It is thought that the hierarchical organization of sensory pathways, from subcortical to cortical structures, and the presence of feedback loops between their stations aids the selective representation of sensory stimuli.

Research on subcortico-cortical loops is gaining momentum internationally. It is becoming increasingly clear that one cannot understand the cortex without understanding its subcortical input and, importantly, one cannot understand subcortical processing without understanding the cortical feedback. In this symposium, we will discuss the role of sensory processing loops for information representation and perception in the auditory, visual and olfactory systems. Four speakers will present data collected in gerbils, mice and bats regarding auditory processing. Specifically, Max Happel (Magdeburg) will speak about the role of the thalamo-cortical circuits for auditory learning. Livia de Hoz (Berlin) will present data on the coding of statistical learning in the auditory midbrain and its modulation through cortico-collicular circuits. Julio Hechavarria (Frankfurt/Main) will speak about the representation of acoustic sequences in the midbrain-cortex axis. One young investigator (Francisco Garcia-Rosales, Frankfurt/Main) will speak about the functional coupling between the auditory cortex and frontal auditory areas that receive direct input from subcortical structures.

Feedback loops are also present in other sensory modalities. Understanding common mechanisms of information processing across modalities will be essential to understand these loops, since sensory circuits differ somewhat in wiring structure. With this in mind, the fourth main speaker (Laura Busse, Munich) will talk about the role of thalamo-cortical loops for shaping receptive fields in the mouse visual system, while Kim Chin Le (young investigator, Aachen) will show data on parallel processing of odor information in the olfactory cortex.

Symposium 20

Friday, March 22, 2019
11:30 - 13:30, Lecture Hall 105

Chairs: Livia de Hoz and Julio Hechavarría,
Berlin and Frankfurt/Main

- 11:30 **Opening Remarks**
- 11:40 Laura Busse, Munich
VISUAL PROCESSING OF FEEDFORWARD
AND FEEDBACK SIGNALS IN MOUSE DLGN
(S20-1)
- 12:00 Julio Hechavarría, Frankfurt/Main
UNDERSTANDING THE AUDITORY
HIERARCHY: MODIFICATIONS TO AUDITORY
PROCESSING ON THE WAY TO THE CORTEX
(S20-2)
- 12:20 Max Happel, Magdeburg
RECURRENT CORTICOTHALAMIC FEEDBACK
IN AUDITORY CORTEX MEDIATING SALIENT
AUDITORY PERCEPTION (S20-3)
- 12:40 Livia de Hoz, Berlin
AUDITORY MIDBRAIN CODING OF TEMPO-
RALLY SPARSE STATISTICS (S20-4)
- 13:00 Francisco Garcia-Rosales, Frankfurt/Main
CORTICAL OSCILLATIONS AID THE REPRE-
SENTATION OF NATURAL VOCALIZATION
STREAMS AT MULTIPLE TIMESCALES (S20-5)
- 13:10 Kim Chi Le, Aachen
DUAL-COLOR IMAGING FOR ISOLATING
OLFACTORY BULB OUTPUT STREAMS IN MICE
(S20-6)
- 13:20 **Concluding Remarks**