

Seminar Announcement

Computational Neuroscience of Human Visual Processes

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A412 (CSE Seminar Room)
Engineering Building

Summary

Spatial perception concerns our ability to sense the position, movement, orientation –and to some extent size and shape– of objects. It is a crucial part of human visual perception since we use spatial information, to localize ourselves in our environment, to direct our attention, and to reach out to and grasp objects. Through the course of this study, we aim to better understand the role of a number of factors in spatial perception.

First, in a series of behavioral experiments we tried to identify how human observers localize objects. We studied whether the way that observers make their identification or localization responses (using either their eyes or by responding via a button press) influenced their performance. In addition, we used fMRI to investigate the neurobiological basis of spatial perception. We examined whether a cortical mapping stimulus based on orientation rather than luminance contrast influences the estimated properties of receptive field populations.

In a separate study, we used MEG (magnetoencephalography) – a tool that allows recording neuronal activity in high temporal frequency–, to study the mechanisms behind a visual learning task, where the subjects had to direct their attention as fast as possible in the presence of a visual cue. In this study, we investigated to what extent we could disentangle the attention-related signals from the brain by using Granger Causality for different feedback types that both reinforced learning.

We conclude that the perception of the spatial location and the identity of objects are highly intertwined processes that similarly affect human eye-movements and perception. Moreover, we found that using orientation rather than luminance contrast provides a better option for spatial mapping of the human visual cortex in particular for higher order areas, such as those involved in global shape perception.

Bio: I obtained my PhD degree with my thesis titled “Visuospatial Perception: from Brain to Behavior” from University of Groningen in Behavioral and Cognitive Neurosciences. I recently I worked as a post-doctoral researcher at Boston University, Biomedical Engineering Department and at Martinos Imaging Center of Harvard Medical School. I am a graduate of Bilkent University Department of Computer Engineering; and I got my MSc degree from Middle East Technical University, Department of Cognitive Science. My research focuses on

applying computational neuroscience approaches to human cognitive processes such as visual perception, learning and spatial perception.