

Exploring sensori-motor interactions.

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In this lecture, I will review three areas of our current research aimed at elucidating the neural mechanisms of sensori-motor interactions.

The first topic concerns the influence of complex visual and auditory input on motor excitability; this work relates to the motor-resonance theory of Rizzolatti and colleagues. I will describe two experiments, carried out with Dr. Kate Watkins, in which we examined the effects of seen and heard speech on the excitability of the face representation in the primary motor cortex, and the role of the Broca's area in mediating these effects.

The second topic addresses the question of visual functions of the frontal-eye field (FEF). I will discuss the results of two experiments, carried out with Dr. Marie-Helene Grosbras, in which we demonstrated the importance of the FEF for visual detection and awareness.

The third topic concerns the role of the superior parietal cortex in the awareness of self-generated movements. I will describe an experiment carried out with Dr. Penny MacDonald.

Taken together, these experiments suggest that there are no boundaries between action and perception.

Suggested reading:

Grosbras MH, Paus T. Transcranial magnetic stimulation of the frontal eye-field: effects on visual perception and attention. Journal of Cognitive Neuroscience 14:1109-1120, 2002.

Grosbras MH, Paus T. Transcranial Magnetic Stimulation of the Human Frontal Eye Field Facilitates Visual Awareness. European Journal of Neuroscience 18:3121-3126, 2003.

MacDonald PA, Paus T. The role of parietal cortex in awareness of self-generated movements: a transcranial magnetic stimulation study. Cerebral Cortex 13:962-967, 2003.

Watkins KE, Strafella AP, Paus T. Seeing and hearing speech excites the motor system involved in speech production. Neuropsychologia 41:989-994, 2003.

Watkins K, Paus T. Modulation of motor excitability during speech perception: the role of Broca's area. Journal of Cognitive Neuroscience (in press).