Abstract for the Nikola Tesla symposium on Monday, Sept 18

HOW NIKOLA TESLA HELPED CRACKING THE NEURAL CODE OF THE MIDBRAIN

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A saccadic gaze shift rapidly directs the eyes to a peripheral visual or auditory target [1]. To study the neural mechanisms underlying saccade programming in monkeys, neuroscientists rely on the precise measurement of eye- and head movements. To that end, the animal is placed in an oscillating magnetic field that induces an ac current in a thin golden ring on the eye, the strength of which depends on the eye's orientation in the magnetic field. The secondary magnetic field produced by this current can in turn be recorded with an induction coil in front of the eye. An advantage of this method is the absence of vulnerable lead wires on the eye itself; a disadvantage, however, is its limited measurement range. I will describe a recent extension of this method to allow the recording of head-free gaze shifts across the entire motor range [2]. I will subsequently show experimental data from eye movement recordings and single-unit neural responses from monkey auditory and visuo-motor midbrain from which we deduce the neural code underlying the programming of gaze shifts to visual and auditory targets [3,4,5].

Key Words: Magnetic induction, Eye movements, Midbrain, Monkey

Selected papers:

[1] Sparks DL (2002) The brainstem control of saccadic eye movements. *Nature Rev* 3: 952-64
[2] Bremen P, Van der Willigen RF, Van Opstal AJ (2006): Using double-magnetic induction to measure head-unrestrained gaze shifts - I Theory and validation. *J Neurosci Meth*, in press.
[3] Zwiers MP, Versnel H, Van Opstal AJ (2004): Involvement of monkey Inferior Colliculus in spatial hearing. *J Neurosci* 24: 4145-56
[4] Goossens HHLM, Van Opstal AJ (2006): Dynamic ensemble coding of saccades in monkey Superior Colliculus. *J Neurophysiol* 95: 2326-41
[5] see also the mini symposium on Sensory Biophysics of Thursday, Sept 21.