IN BRIEF

PLACE CELLS

Intracellular dynamics of hippocampal place cells during virtual navigation

Harvey, C. D. *et al. Nature* **461**, 941–946 (2009)

To elucidate how intracellular electrical properties of hippocampal place cells encode spatial information, the authors carried out whole-cell recordings of place cells in head-restricted mice that navigated a virtual environment on a spherical treadmill. They identified three sub-threshold membrane potential dynamics of place fields that underlie rate and temporal coding: asymmetrical ramp-like depolarization of the baseline membrane potential, increased amplitude of intracellular theta oscillations, and phase precession of the intracellular relative to the extracellular theta oscillation. This new method will help to refine current coding models for navigation.

LEARNING AND MEMORY

Learning by observation requires an early sleep window

Van Der Werf, Y. D. *et al. Proc. Natl Acad. Sci. USA* **106**, 18926–18930 (2009)

The authors tested whether sleep improved motor skill learning in subjects that learned by observation a sequence-specific finger tapping task. Subjects that had slept immediately after observing subsequently performed the task more quickly and accurately than subjects that did not sleep within 12 hours of observing. This effect is similar to that seen after a skill is learnt by practicing. Therefore, sleep after observation-based learning paradigms might improve the (re)learning of motor skills of children, athletes and patients after stroke.

LANGUAGE

An anatomical signature for literacy

Carreiras, M. *et al. Nature* **461**, 983–986 (2009)

Which structural brain changes contribute to learning to read? The authors compared structural MRI scans of late-literate and illiterate adults and then determined the functional connectivity of the identified areas in early literates. They found that learning to read strengthens the coupling between the left and right angular gyri and that this coupling is mediated by anatomical white-matter pathways through the splenium of the corpus callosum, a brain region that was previously implicated in reading by lesion studies. Furthermore, during reading functional interactions between visual processing in the dorsal occipital gyrus and speech processing in the supramarginal gyrus are mediated by the angular gyrus. These findings can now be used to study dyslexia.

NEURAL CODING

Neural representation of time in cortico-basal ganglia circuits

Jin, D. Z., Fuji, N. & Graybiel, A. M. *Proc. Natl Acad. Sci. USA* 22 Oct 2009 (doi:10.1073/pnas.0909881106)

The authors investigated how time is represented in cortico-basal ganglia circuits by recording from thousands of neurons in the prefrontal cortex of two macaque monkeys performing a visuomotor task. A subset of neurons exhibited spike activity peaks that occurred at particular time delays after single task events, suggesting that time representations emerge as by-products of event coding in cortico-basal ganglia circuits.