

## IN BRIEF

## ➤ LEARNING AND MEMORY

**Bursting not spiking**

Working memory is thought to depend on sustained activity in prefrontal cortex (PFC) neurons. Here, spiking and local field potentials were recorded on a trial-by-trial basis from PFC neurons in monkeys trained in a working memory task. During the delay between stimulus and response there were bursts of spiking in individual neurons, increased gamma oscillations and suppressed beta oscillations, suggesting that working memory is encoded by bursts of activity rather than by sustained activity.

**ORIGINAL ARTICLE** Lundqvist, M. *et al.* Gamma and beta bursts underlie working memory. *Neuron* <http://dx.doi.org/10.1016/j.neuron.2016.02.028> (2016)

## ➤ NEURODEGENERATIVE DISEASE

**A storage or retrieval problem?**

One of the hallmarks of Alzheimer disease (AD) is a loss in hippocampus-dependent episodic memory. Whether this results from a failure in memory storage or retrieval is unknown. In a contextual fear conditioning (CFC) model, transgenic mouse models of early AD have defects in long-term memory (LTM) and show age-dependent spinal loss of dentate gyrus (DG) cells. Optogenetically induced long-term potentiation of DG neurons activated during CFC learning (called engram cells) induced memory retrieval, and reduced spinal loss and LTM deficits, suggesting a possible strategy for reversing memory loss in early AD.

**ORIGINAL ARTICLE** Roy, D. S. *et al.* Memory retrieval by activating engram cells in mouse models of early Alzheimer's disease. *Nature* **531**, 508–512 (2016)

## ➤ LEARNING AND MEMORY

**Rebalancing the brain**

The formation of associative memories requires the strengthening of cortical synapses, which temporarily disrupts the excitation–inhibition (EI) balance. Functional MRI was used to analyse subvoxel neuronal activity patterns in the cortex of individuals who had been trained to associate pairs of stimuli. The neuronal activity patterns produced by paired stimuli showed representational overlap that gradually diminished as EI balance was restored. Local reduction in cortical GABA reinstated the EI imbalance, representational overlap and cortical memory, suggesting that associative memories are stored in cortical ensembles in which there is a balance between excitation and inhibition.

**ORIGINAL ARTICLE** Barron, H. C. *et al.* Unmasking latent inhibitory connections in human cortex to reveal dormant cortical memories. *Neuron* <http://dx.doi.org/10.1016/j.neuron.2016.02.031> (2016)

## ➤ SENSORY SYSTEMS

**Crossing territories**

Blind individuals exhibit substantial cortical remodelling between sensory cortices, but whether this occurs in the normal adult brain is unknown. In this study, sighted individuals who attended a 9-month course in reading Braille exhibited substantial cross-modal reorganization in visual cortical areas including the visual word form area (VWFA). Subjects also had strengthened resting-state connectivity between visual and somatosensory cortices, and disruption of VWFA activity by transcranial magnetic stimulation decreased Braille reading accuracy. These findings suggest that cortical reorganization can occur in the healthy adult brain when learning complex tasks.

**ORIGINAL ARTICLE** Siuda-Krzywicka, K. *et al.* Massive cortical reorganization in sighted Braille readers. *eLife* <http://dx.doi.org/10.7554/eLife.10762> (2016)