power after learning. Nevertheless, they found a remarkably simple correlate of task-related activity by measuring each unit's coupling to low-frequency LFP oscillations, assessed simply by the size of the spike-triggered average LFP. The coupling of TR_d and TR_i units (that is, cells that increased their rates during robot arm movement) increased, whereas the coupling of TU units (whose firing rate was unrelated to arm movement) did not. Furthermore, the coupling of TR_d+ units increased more than the coupling of TR_d- units. In other words, the units that the experimenters randomly chose to positively control robot arm increased their coupling to the slow oscillation more than those that were chosen to control it negatively. The experiment could be therefore be viewed as a blinded, randomized test of the sleep replay hypothesis.

The LFP is not generally believed to have a major role in communication between neurons, but is instead an indirect signature of the activity patterns of large neuronal populations. What do the results of Gulati *et al.*[4] imply for these patterns? In the synchronized-state cortex, negative LFP waves are signatures of up phases. Gulati *et al.*[4] reported that TR units increase their locking to the LFP after learning, with no consistent change in firing rate and no consistent change in LFP power spectrum. These results would appear to imply that the frequency and size of spontaneous activity packets was not changed, but the spikes of the TR units rearranged to become more tightly associated with the packets (**Fig. 1**). This interpretation is also supported by several other observations made by Gulati *et al.*[4], including increased spike-spike coherence and cross-correlation of TR, but not TU, units after learning, as well as more complex analyses that showed reactivation of movement-related firing rate vectors specifically during LFP delta waves.

If cortical up phases do indeed have a privileged role in memory consolidation, then such a temporal rearrangement of spikes might help consolidate synaptic plasticity specifically in those neurons involved in task performance. The experiment, however, also raises new questions. What determines which neurons increase their firing rates during brain–machine interface control to become TR units, and which neurons remain as TU units? How do the TR units 'remember' their identity in the later sleep session: is it simply because they fired more, or are more complex processes at work? Which molecular signals maintain the 'memory trace' by which the TR units recall their identity in subsequent sleep? What are the circuit properties that determine the amount of phase-locking a neuron exhibits in sleep, and how are they modified after task performance? And what is the functional consequence of the increased phase locking? Using further interventions and randomized tests, answers to these questions may soon be found.

COMPETING FINANCIAL INTERESTS
The author declares no competing financial interests.

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A common affective code

Our experiences of the external events and objects that we encounter are colored by our internal subjective reactions to them; don rose-colored lenses and even the gloomiest day gives way to a sunny disposition. But how does the brain encode the affective value—positive or negative valence—of stimuli? Is there a common neural code for the joyful feeling roused by the sight of playful puppies and the aroma of a warm apple strudel?

Chikazoe *et al.* address this question on page 1114 of this issue by presenting volunteers with images that varied in terms of their visual complexity, level of animacy and subjective affect. Using patterns of activity measured with BOLD fMRI, the authors found that subjective affect (whether a stimulus was perceived as pleasing or unpleasant) was represented in the orbital frontal cortex (OFC), whereas visual complexity and animacy were represented in early visual and ventral temporal cortices, respectively. The more similar the images were rated on affect, the more closely the patterns of activity in the OFC matched each other irrespective of the exact visual features of the stimuli. This code was found to be intermingled in the same areas of the OFC, explaining why previous attempts to find specific regions for positive or negative valence have failed.

To see if this code applies to different types of sensory stimuli, the authors presented the same subjects with different tastes that varied in their affective qualities. Patterns of activity in the OFC represented the affective properties of the tastes independent of whether they were sweet, salty, bitter or sour, and pleasant or unpleasant tastes and images elicited similar patterns of activity.

To further demonstrate the commonality of this affective code, the authors decoded the affective experience of a subject by using the activity patterns of other subjects. The response to one stimulus predicted the response to similar stimuli in other people. This worked across modalities such that the reaction to a bad taste in some predicted the neural response to an unsightly image for others.

These results indicate that, in the OFC, the brain represents the valence of stimuli independent of their sensory attributes and forms a higher, abstract affective representation akin to other categories (such as animate or inanimate) in different brain regions. Thus, for the OFC, it's all the same whether a stimulus is made of sugar, spice or anything nice.

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