Interestingly, a recent study[2] revealed firing rate differences during motion categorization, but, in apparent contrast with Crowe *et al.*'s findings[6], its results suggest that the PPC is more important, as categorization signals were stronger and were more strongly correlated with behavior in the parietal rather than the frontal lobe[2]. One possible explanation lies in the fact that the two studies focused on different subdivisions of the parietal lobe. A second clue is that the categorization effects in the previous study[2] were primarily seen for stimuli that appeared in a neuron's receptive field (that is, were combined with information about spatial position, which was irrelevant to the task), suggesting that they may be related to aspects of attention or visual processing rather than categorization *per se*.

Perhaps the most interesting explanation for this discrepancy, which ties in with the neuropsychological literature in humans, is that the differences are related to the use of a flexible versus constant categorization scheme. In the study of Crowe *et al.*[6], the monkeys flexibly switched rules, whereas in the previous study[2] they used a constant categorization boundary that did not change over the experiment duration. It is therefore possible that the PFC is recruited if the task is more dynamic or difficult, whereas there is a stronger reliance on the PPC if the task is habitual or overtrained. Consistent with this idea, Crowe *et al.*[6] found that PFC responses were stronger in the task version that the monkeys found more difficult (above versus below rather than right versus left categorization rule). It should be noted, however, that an earlier study found stronger frontal signals on a spatial categorization task even in a fixed boundary task[4]; thus, this hypothesis remains to be verified in future investigations.

Perhaps the most important question raised by Crowe *et al.*[6] is that of causation. The analysis that the authors used is a variant of the so-called Granger causality analysis, which was developed in economics and determines the extent to which a time series can be predicted by another time series that precedes it in time. Although this method can robustly detect correlations, it is a fundamental mantra in scientific research that correlation does not imply causation. In the present study, the PFC signal may have preceded the one in the PPC because of direct information transmission between the two other areas. However, it is also possible that a third source provides a common signal to the PFC and to the PFC at different delays, and this scenario cannot be ruled out.

Thus, as the authors are careful to note, the results do not establish a causal or exclusive role of the PFC in categorization. Establishing such a role will ultimately require building a true model of the task, which accounts for categorization responses found in other areas[3] and provides a mechanism by which categories are read out for the behavioral decision, and uses interventional methods such as reversible inactivation. The present study makes an important advance toward this difficult goal by providing a tool that has general utility for analyzing the direction and content of inter-areal information transmission.

COMPETING FINANCIAL INTERESTS
The author declares no competing financial interests.

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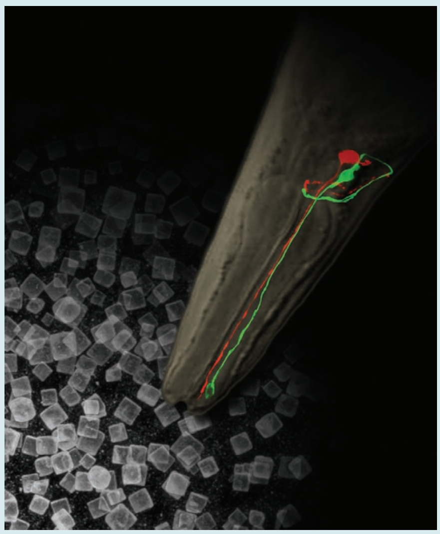
Context-dependent plasticity in a sensory circuit



Animals sense the world around them using specialized sensory neurons that are wired into circuits that process sensory information and use it to guide behavior. Such sensory circuits are plastic, with their sensitivity and even constituent neurons changing in regard to context. On page 1461 of this issue, Leinwand and Chalasani take advantage of the relatively simple nervous system of *C. elegans*, with its 302 identified neurons, to show how a chemosensory circuit changes its composition depending on context.

C. elegans can sense many chemical stimuli in their environment, leading to either attraction or repulsion. Cell ablation experiments have shown that ASE sensory neurons are required for attraction to salts, whereas the AWC sensory neurons are required for attraction to odors. ASE neurons are further subdivided into the ASEL and ASER neurons, and AWC neurons have ON and OFF subtypes. The authors used calcium imaging to show that, although the ASEL neuron (red) responds to low concentrations of NaCl, the AWC^{ON} neuron (green) responds to high concentrations of NaCl. Similarly, although ASE neurons are required for behavioral attraction to low salt concentrations, AWC neurons are also necessary for attraction to higher salt concentrations. Both ASE and AWC neurons project to the AIA interneuron, which also responds to NaCl. The authors found that AIA responses to high salt concentration depend on the AWC^{ON} neuron.

These results suggest that the AWC^{ON} neuron, which is not normally part of the salt-sensing circuit, is recruited into a new circuit at high salt concentrations. The role of the AWC^{ON} neuron in this circuit is different from its known role in sensing odorants, as its sensory cilia were not required for its response to high salt concentrations. The recruitment of the AWC^{ON} neuron into the circuit required the release of the insulin-like peptide INS-6 from the ASEL neuron in response to high salt concentrations. INS-6 signals through the insulin receptor DAF-2 to switch the AWC^{ON} sensory neuron into an interneuron in the salt-sensing circuit. Disrupting insulin signaling also blocked behavioral responses to high salt concentrations. The authors' findings describe a neuropeptide-mediated mechanism in which a sensory circuit can adapt to environmental context to drive context-appropriate behaviors.

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