In two publications presented as a contest, Hopfield and Brody propose a mechanism for detecting groups of neurons receiving similar levels of sensory input.

The author is at the Volen Center and

number of potential uses. A simplified description of what Hopfield and Brody did with this idea is provided by Fig. 2. Suppose we wanted a neural circuit to signal whether stimulus A was followed, within a variable but limited time, by stimulus B. In the spirit of their more complex model, Hopfield and Brody would arrange, using additional circuitry, for the red and blue neurons in Fig. 1 to receive the input depicted by the red and blue lines in Fig. 2. When stimulus A is presented, the input to the blue neuron (the blue line) jumps to a fixed value and then decays slowly to zero. When stimulus B appears, the input to the red neuron (red line) jumps up similarly but decays more quickly. The crossing of the two input levels (green dot) signals that the sequence AB has occurred, independent, over a fairly broad range, of the precise time interval between A and B. The crossing never occurs for the sequence BA. Using the idea discussed in the previous paragraph, the crossing point for the two input levels can be identified by a downstream coincidence detector, which thereby serves as an interval- invariant (over a finite range)

ay and collaborators shows that the solution was obtainable (actually with $n = 2$; Benjamin Rahn, a graduate student at the California Institute of Technology also came up with the solution), and is an exceptionally clear example of the type of reasoning Hopfield and Brody wanted to foster. Hopfield and Brody also set up the contest so that people could think about the model and the issues it raises on their own, even if unsuccessfully, before having the solution presented to them. In this sense, the real winners of the contest may not have been the people who won the prizes.

Reactions to the contest format through which Hopfield and Brody presented their work have been mixed. On one side, the contest was stimulating, challenging and fun. From my experience, it certainly made for a number of lively conversations. On the other hand, holding back knowledge somehow seems contrary to the spirit of free scientific discourse. The contest was proposed as an educational device, and it illustrates the difficulties inherent in mixing educational and research styles of presentation. Ironically, many commonly used educational techniques, such as withholding information for the purpose of challenging or testing students, clash with the standards of equality and openness that we strive for in scientific research.

As with any work in theoretical neuroscience, the ultimate judgment is whether the proposed mechanism is actually used in a biological system. It may prove challenging to make the synchronization and coincidence-detection mechanisms work in as noisy an environment as a cortical circuit, although Hopfield and Brody report positive evidence along these lines[1,3]. Independent of the contest, the proposed mechanism for detecting groups of neurons receiving similar levels of sensory input is a valuable addition to our knowledge of the computational capacity and strategies that neural circuits could and might use.

1. Hopfield, J. J. & Brody, C. D. *Proc. Natl. Acad. Sci. USA* 97, 13919–13924 (2000).
2. http://shadrach.cns.nyu.edu/~carlos/Organism/
3. Hopfield, J. J. & Brody, C. D. *Proc. Natl. Acad. Sci. USA* (in press).
4. http://shadrach.cns.nyu.edu/~carlos/Organism/Docs/winners.html
5. van Vreeswijk, C., Abbott, L. F. & Ermentrout, G. B. *J. Comp. Neurosci.* 1, 313–321 (1994).