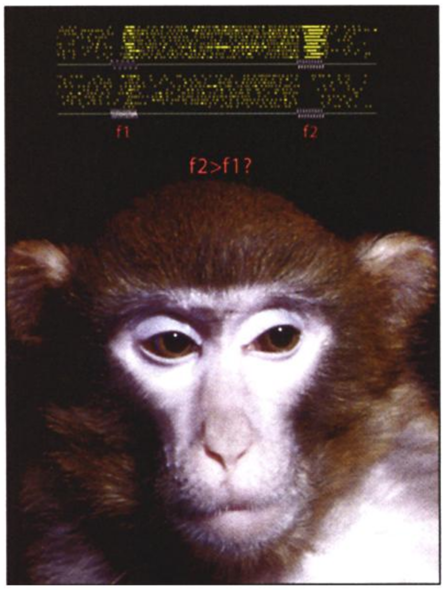

Decisions, decisions. Some neurons (top cluster) increase and others (bottom cluster) decrease their firing rates while evaluating vibrations.

"They've got a task where the different things that a brain must do are spread out in time and characterized so that linking the activity of a neuron to a certain stage of processing is cleaner than in other studies," says Jeffrey Schall of Vanderbilt University in Nashville, Tennessee.

When the probe delivers the first vibration, Romo's team found, 14% of the neurons change their firing rate. When the vibration stops, approximately half of these responders keep firing at the altered rate. In addition, a group of neurons that hadn't originally responded to the vibration chime in. Just before the monkey receives the second vibration, therefore, about 28% of the neurons in the MPC appear to be holding a trace of the first sensation.

During the second vibration, some neurons keep responding to the frequency of the first, while others that originally responded to the first vibration begin firing at a rate that correlates with the frequency of the second. A few milliseconds later, members from both groups, in addition to other neurons that had been uninvolved, begin firing as a function of the difference between the two stimuli—some boosting their activity when the first vibration is of higher frequency than the second and others when the second vibration's frequency is higher.

At the height of the comparison, while the monkey is remembering the first vibration but feeling the second, 53% of the neurons are firing at rates that reflect the difference between the two vibrations. "It's like an avalanche," says Romo. Then the number of participating neurons falls off as the second vibration ends and the animal moves its hand to press a button. Some neurons recruited late during the comparison period keep signaling the frequency difference up to the moment the monkey pushes the button. The authors conclude that neurons in the MPC reflect the entire decision-making process, with a few multitalented cells involved from start to finish.

Romo and others aren't sure whether MPC cells are performing the computations that underlie decision-making themselves or simply echoing the work of other neurons. Romo says his unpublished studies indicate that nearby brain regions harbor neurons that behave similarly to those in the MPC. But then, it's not surprising that accurate decision-making—which wins the monkeys a squirt of fruit juice—requires a lot of neurons to pitch in.

—MARINA CHICUREL

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ASTROPHYSICS

Stellar Pair Whirls in a 5-Minute Dash

European astronomers have identified what they believe is the tightest pair of stars yet seen: two white dwarfs that dash around each other every 5 minutes. If confirmed, the whirling dervishes are revolving twice as fast as the previous closest pair. Moreover, says astronomer Gianluca Israel of the Astronomical Observatory of Rome in Italy, "this represents one of the most promising targets for detection of gravitational waves": eerie ripples in space-time that a future orbiting observatory will chase.

Many stars come in binaries. If each is about as massive as the sun, they become white dwarfs—dense Earth-sized remnants of their cores—when they run out of hydrogen fuel. Perhaps 100 million such pairs fleck our galaxy. Most take years to orbit, but the closest together take mere hours or minutes. In the tightest pairs, astrophysicists believe, the more massive dwarf rips matter from its partner. When the gas crashes onto the dominant star, it emits x-rays.

Such x-rays may stream from RX J0806.3+1527, a source in the constellation Cancer. A German satellite called ROSAT spotted the object in the 1990s, but not until 1999 did astronomers realize that its signal fluttered every 321 seconds. The x-rays vanished for half that time, as if a hot spot were rotating into and out of view.

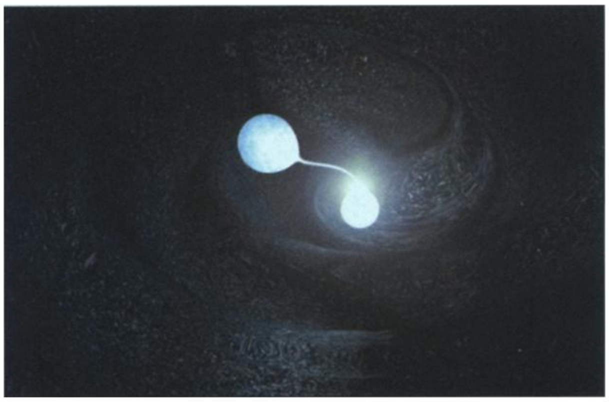
Now, two independent teams have studied the system with optical telescopes. Between 1999 and 2001, Israel and his colleagues used spectrographs on two of the four 8.2-meter telescopes in the European Southern Observatory's Very Large Telescope (VLT) array in Chile as well as other instruments to monitor a faint blue star that fluctuates with the same 321-second period in the same position. A team led by astronomer Gavin Ramsay of University College London also detected that cycle 2 months ago with the 2.5-meter Nordic Optical Telescope in the Canary Islands.

A single star, such as a slowly spinning neutron star, cannot explain the patterns, both teams maintain. Rather, they think two white dwarfs are locked in a sizzling tango about 80,000 kilometers apart—just one-fifth of the distance from Earth to the moon. Their reports, posted online at xxx.lanl.gov/abs/astro-ph/0203043 and /0203053, will appear in *Astronomy & Astrophysics* and the *Monthly Notices of the Royal Astronomical Society*, respectively.

Other astronomers are excited but await more results. "Misidentifications are easily made," cautions astrophysicist Simon Portegies Zwart of the University of Amsterdam in the Netherlands. Simultaneous studies of the system in x-rays and optical light might clinch the case. X-rays from the massive dwarf should light up the closest side of its companion. As the tandem revolves and each dwarf shows its hot face, the x-rays should wax when the optical signal wanes, and vice versa. Israel and his team think they saw that pattern in November with NASA's Chandra X-ray Observatory and VLT, but they are still analyzing the data.

Whether the white dwarfs collide in about 10,000 years or drift farther apart depends on their masses. In the meantime, their breakneck pace should whip the fabric of space like an eggbeater and churn out "easily detectable" gravitational waves, says astrophysicist E. Sterl Phinney of the California Institute of Technology in Pasadena. Phinney is a leader of the Laser Interferometer Space Antenna planned for launch within a decade that hopes to "hear" such binary systems (*Science*, 21 April 2000, p. 422). "There are thousands of similar systems in the galaxy," says Phinney, "but this is the nearest and brightest."

—ROBERT IRION



Dashing dwarfs. Matter cascading between dead stars triggers x-rays that may have revealed the fastest binary pair yet.