control robotic arms for tasks such as eating.

Carlos Vargas-Irwin at Brown University in Providence, Rhode Island, and his colleagues monitored brain activity in two macaque monkeys by using electrodes implanted into the arm/hand area of the primary motor cortex. A motion-capture system tracked arm, wrist and hand movements as the monkeys reached to grab objects swinging towards them.

The researchers found that data on firing rate from small clusters of nearby neurons were enough to reconstruct entire reach-and-grasp motions.

REMOTE SENSING

Great heights

Geophys. Res. Lett. doi:10.1029/2010GL043622 (2010)

Towering more than 40 metres high, the Douglas firs, coast redwoods and giant sequoias of the North American Pacific coast stand out as some of the world's tallest trees, according to a map charting the canopy height of Earth's forests.

Michael Lefsky at Colorado State University in Fort Collins created the map by using pulses of laser light sent from three NASA satellites. By observing how much longer it took the pulses to return from the ground than from the top of the tree canopy, Lefsky could estimate tree height.

The result could help to gauge arboreal biodiversity and to estimate how much carbon is stored in the world's trees.

PUBLIC HEALTH

HIV blocker

Science doi:10.1126/science.1193748 (2010)

After 15 years of failed attempts to develop an effective anti-HIV vaginal gel, a clinical trial has shown that one containing an antiretroviral drug can cut HIV infection in women by more than 50% if used consistently.

Quarraisha Abdool Karim at the Centre for the AIDS Program of Research in South Africa, in Durban, and her colleagues tested the 1% vaginal gel formulation of the drug tenofovir. The 2.5-year study involved 889 South African women aged between 18 and 40 years who were HIV negative, sexually active and at high risk of HIV infection.

Compared with women who used a placebo, the tenofovir gel reduced HIV infection in the group by 39% overall, and by 54% in women who used the gel most consistently before and after sex.

For a longer story on this research, see go.nature.com/Zmigjx

ASTROPHYSICS

Magnetic star

Astrophys. J. **718,** 331–339 (2010)

On 19 March 2010, scientists discovered a rare astronomical object called a magnetar. For 20 days, SGR J1833-0832 emitted weak bursts of X-rays — and then fell silent.

Magnetars are neutron stars surrounded by immensely strong magnetic fields and have unpredictable burst periods. They are difficult to spot because they are so rare and are active only for a short period of time: just days to months.

Ersin Göğüş from the Sabancı University in Istanbul and his colleagues discovered the magnetar with the Burst Alert Telescope aboard NASA's Swift satellite. Using other telescopes and satellites, they tracked its location and determined its properties, noting that it spins with a period of 7.56 seconds, similar to that of other magnetars.

TRIMMER LAB/TUFTS UNIV.

ANIMAL LOCOMOTION

Gutsy move

Curr. Biol. doi:10.1016/j.cub.2010.06.059 (2010)

In an unusual display of visceral prowess, the tobacco hawkmoth caterpillar crawls by sliding its gut forwards; the rest of its body and legs then follow on behind.

Michael Simon at Tufts University in Medford, Massachusetts, and his colleagues used X-ray imaging and light microscopy to measure the gut's position relative to the body over time in the caterpillars (*Manduca sexta*; pictured) as they crawled. A caterpillar begins by swinging its hind leg — the terminal proleg — forwards. This kicks off the gut slide, which shortens and then lengthens, like a piston, as the caterpillar shifts forwards. The body and the abdominal prolegs then catch up with the gut, which is attached only to the mouth and the rectum.

The team thinks that this mechanism may have evolved to minimize disturbances to the digestive system during crawling.

JOURNAL CLUB

Kenji Doya
Okinawa Institute of Science and Technology, Japan

A neuroscientist explores what brain imaging can reveal about deliberative and intuitive decision-making.

When you pick a dish from a menu, do you select it for its taste or its calculated nutritional benefits? The decision-making processes of intuition and deliberation can be considered as, respectively, model-free learning, which involves trial and error, and model-based learning — evaluating future outcomes using a pre-learned model of the results of choices. A big question is how these complementary processes are realized in the brain.

Using functional magnetic resonance imaging (fMRI) in humans, Jan Gläscher at the California Institute of Technology in Pasadena and his co-authors found neural signatures for these two modes of learning (J. Gläscher *et al. Neuron* **66,** 585–595; 2010). The team scanned the brains of volunteers as they learned a two-step choice task. During the first part of the study, volunteers were presented with an abstract image and had to choose a left- or right-button press. Depending on which button they chose, they were then presented with another image and asked to make a second left-or-right choice to see a third image.

Over many trials, the volunteers learned the probability of a certain image resulting from a particular choice. During the half-time break, they were told that each final image would have a specific monetary reward (0, 10 or 25 cents). During the second half of the study, volunteers could use what they had learned in the first half to make profitable choices.

Analysis of the fMRI data revealed involvement of the brain's intraparietal and lateral prefrontal cortices in model-based learning, and the ventral striatum in model-free learning. The study paints a new picture of the neuroscience of deliberation versus intuition. We should now be able to ask not only where in the brain but also by what algorithms we make decisions.

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