

## Brains hammer home categorical knowledge

A hit song from about 30 years ago was titled "The Windmills of Your Mind." Results of a new scientific study may inspire a sequel to that tune: "The Pigs and Pliers of Your Brain."

Scientists at the National Institute of Mental Health in Bethesda, Md., have found that knowledge about the names of animals and tools—two broad categories of objects—gets handled by largely separate networks of brain regions. The organization of these networks reflects, at least in part, cerebral recognition of unique properties associated with items in each category, the investigators contend in the Feb. 15 *NATURE*.

That means, for instance, that when volunteers silently name animal pictures, strong responses occur in early visual processing areas that help sort out subtle differences in appearance. When people silently name pictures of tools, activity rises markedly in two patches of brain tissue that had previously been implicated in imagined hand movements and the generation of action words (such as saying

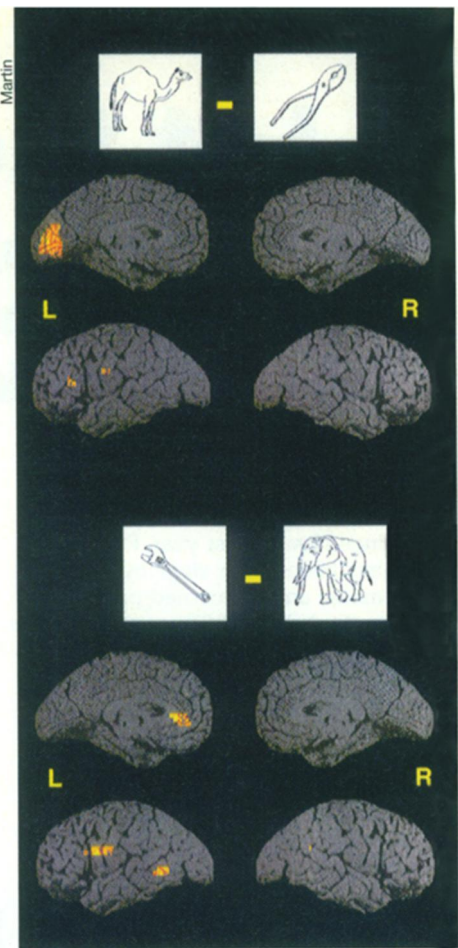
"write" when shown a picture of a pencil).

"We think that when you see an object, brain networks are automatically activated that contain verbal knowledge about that object's attributes and uses," asserts study director Alex Martin. "This allows the object to be categorized."

Until now, isolated cases of people with brain damage have provided most of the evidence of specialized neural circuits devoted to categorical knowledge. Some of these people find themselves unable to name living things; others draw a blank when shown man-made objects.

Martin's group used positron emission tomography (PET) scans to identify brain areas associated with the silent naming of common animals and tools by eight men and eight women, all neurologically healthy. The data charted increases and decreases in blood flow throughout the brain during these tasks. The technique provided an indirect look at whether particular brain regions worked harder or eased up during the tasks.

The researchers also compared the



Different areas are uniquely activated by naming animals (upper images) and tools (lower images). Inner (top) and surface (bottom) images of the brain are shown.

data to PET scans showing brain activity stimulated when participants viewed fuzzy images similar to a television test pattern and a series of nonsense objects with no discernible use.

Naming both animals and tools boosted activity in a part of the temporal lobe that deciphers visual forms. The two tasks also yielded comparable blood-flow surges in a frontal brain area linked to speech and grammar use.

From that common foundation, the activity in response to animal and tool pictures spread through the brain in different directions, Martin and his coworkers hold. Animal pictures triggered cellular exertion in a visual area that aids in distinguishing, for example, a leopard's spotted coat from a lion's shaggy mane. Tools generated activity in two areas that identify how and for what purposes implements get used, the scientists maintain.

Martin's group also presented PET data in the Oct. 6, 1995 *SCIENCE* pointing to the existence of separate brain systems for knowledge about the colors and uses of objects.

Further brain-scan evidence on verbal and other knowledge of certain categories of objects, obtained by researchers at the University of Iowa College of Medicine in Iowa City, is slated for publication later this year. — B. Bower

## New comet may delight in late March

Japanese amateur astronomer Yuji Hyakutake knows how to handle a pair of binoculars. Last Christmas, he used his high-powered optics to discover a faint comet. On Jan. 30, with a second discovery, he truly hit pay dirt.

Astronomers predict that the comet he spied that day will venture within 14.5 million kilometers of Earth on March 25, then head toward a close encounter with the sun on May 1. The combination of events may make the comet visible to the naked eye for the better part of a month, beginning in late March. At its most luminous, it could rival the brightness of the star Betelgeuse.

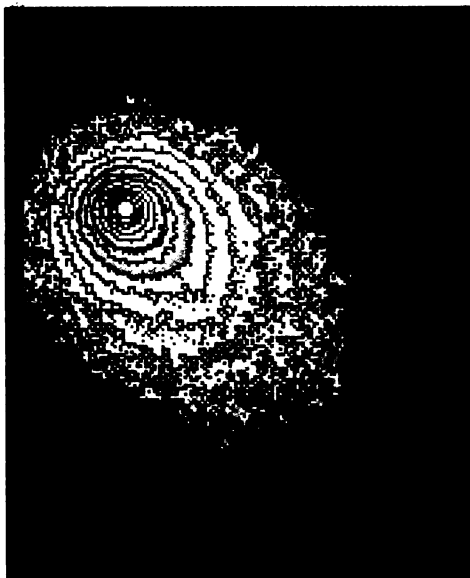
A close encounter with either the sun or Earth brightens a comet's appearance, but "it's unusual to have a close approach to both," says Brian G. Marsden, head of the Central Bureau for Astronomical Telegrams in Cambridge, Mass. Hyakutake reported the new find, officially named 1996 B2 but more commonly referred to as Comet Hyakutake, in a Jan. 31 circular of the International Astronomical Union.

Skywatchers in the Northern Hemisphere are expected to have a clear view of the comet because it will initially appear high in the sky, near the north celestial pole, all night.

"During the first few weeks of April, the comet should be relatively easy to observe," says astronomer James V. Scotti of the University of Arizona in Tucson.

Although Comet Hyakutake may dim as it dives south and moves away from Earth, astronomers expect the icy body to brighten again by May 1 as it ventures within 32 million km of the sun. Sunlight vaporizes icy material on a comet's surface. This vapor drags dust out along with it, boosting a comet's brilliance by reflecting more sunlight.

Some comets visiting the inner solar system for the first time expel their reserves of water-ice before they near the sun. Because no one knows whether Comet Hyakutake is a first-time visitor, Marsden says, there's no guarantee that it will dazzle skywatchers next month. — R. Cowen



False-color image of Comet Hyakutake.

H. Cabot et al./Pic du Midi Observatory