Behavior

A brain area to count on

Some people have a head for numbers, while others head for cover at the mere mention of balancing a checkbook. But everyone blessed with good neurological health employs the same brain region to discern differences between small quantities of items, a new study suggests. What's more, this region assumes its numerical duties by age 5.

Discerning the larger of two numbers elicits similar patterns of electrical activity in the brains of 5-year-olds and adults, say psychologists Elise Temple and Michael I. Posner of the University of Oregon in Eugene. The active tissue, concentrated in a section of the brain's outer layer, or cortex, located near the ears, constitutes a "number comparison area," according to the researchers.

Since a basic cerebral capacity for counting emerges so early in life, educational programs aimed at fostering arithmetic skills in young children may need to begin before first grade, Temple and Posner contend in the June 23 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.

In a series of trials, 15 adults, 19 to 38 years old, and 13 children, all 5 years old, performed number comparisons while wearing elastic caps studded with 128 electrical sensors. The groups had roughly equal numbers of males and females.

Each number comparison required participants to look at a computer screen showing either a numeral—1, 4, 6, or 9—or a corresponding array of solid circles. They then pressed one of two keys as quickly as possible to indicate whether the number was larger or smaller than 5.

Youngsters took longer to respond and committed more errors than adults, but they still answered correctly most of the time. Electric activity associated with number comparisons occurred in similar patterns within a common cortical region for the children and adults, Temple and Posner report.

Other studies indicate that electric activity in the brain sparked by reading individual words differs markedly between children—even 10-year-olds who read well—and adults.

The new results support the view, which has gained prominence in the past decade, that people and many other animals possess a nonverbal brain system for reasoning about small quantities, comments psychologist Charles R. Gallistel of the University of California, Los Angeles. Formal types of number manipulation by humans have developed out of this "foundational" counting capacity, argue Gallistel and his UCLA colleague Rochel Gelman. —*B.B.*

Traumatic rider to mental illness

Post-traumatic stress disorder (PTSD), a set of disturbing symptoms thought to develop in some people after close brushes with death or other traumatic events, may often accompany other severe forms of mental illness. Yet in these cases, the disorder often goes undetected by clinicians, according to preliminary evidence.

A team led by psychiatrist Kim T. Mueser of New Hampshire-Dartmouth Psychiatric Research Center in Concord recruited 275 individuals with schizophrenia, manic depression, and other severe psychiatric disorders who received mental health care at any of four public facilities.

Nearly all participants had experienced at least one traumatic event in their lives, such as childhood sexual abuse, a serious car accident, or witnessing the killing of another person. The researchers assigned a diagnosis of PTSD to 119 individuals, or 43 percent of the sample. However, clinical records included a diagnosis of PTSD in only three cases, Mueser's group reports in the June JOURNAL OF CONSULTING AND CLINICAL PSYCHOLOGY.

The overall prevalence of PTSD among people with severe mental illnesses and PTSD's effects on these conditions remain unknown, the researchers note. —*B.B.*

Biology

Chickadees sneak up the social ladder

Genetic tests of black-capped chickadees show the benefits of fooling around.

Nestlings whose mother had sneaked off to visit another male usually had dads that ranked higher in dominance than their mother's nest mate. Ken Otter, now at the University of Copenhagen, and his colleagues drew that conclusion from analyzing DNA from 58 nests.

Seventeen of the family groups included offspring sired by a male other than mom's social mate. The researchers managed to track down the biological father of most of these youngsters, and 11 out of 15 outranked the guy at the home nest.

Previous chickadee studies had hinted that females might use their on-the-side flirtations to upgrade the available genes. In winter flocks, for example, females solicit attention from high-ranking males. The DNA results confirming this suspicion were posted online June 24 in BEHAVIORAL ECOLOGY AND SOCIOBIOLOGY. —*S.M.*

Looking for life in all the worst places

Thriving microbial communities have turned up in one of the coldest spots on Earth—some 6 feet under the permanent ice cover of lakes in Antarctica.

In the McMurdo Dry Valleys, annual temperatures drop as low as -45°F, and precipitation amounts to only 4 inches a year. The summer sun, however, warms grit stuck in the ice and creates small, enclosed slushy worlds. These complex microbial communities include cyanobacteria that photosynthesize even in the dim light available deep in the ice.

During the dark of winter, the ice freezes solid again, and the communities shut down until the next year. "They're really trapped in the ice," says Stephen J. Giovannoni of Oregon State University in Corvallis. He and his colleagues describe their discovery in the June 26 SCIENCE.

Life goes on in some pretty cold places, note Roland Psenner and Birgit Sattler at Innsbruck University in Austria. In an accompanying commentary, they point out that brine in sea ice harbors algae and crustaceans and that bacteria inhabit the slush on lakes high in the Alps. But even by these standards, Psenner and Sattler view Antarctic ice conditions as "extreme." —*S.M.*

Life on ice: Close-up of an Antarctic cyanobacteria colony some 35 micrometers across.

Plummeting falcons stay in control

New techniques of measurement are revealing how a gyrfalcon sky dives without ending up as a splat of feathers.

Gyrfalcons plunge at speeds up to 58 meters per second (130 mph), report Vance A. Tucker at Duke University in Durham, N.C. , and his colleagues. That's faster than any earlier method could measure reliably, he says.

Tucker followed falcon dives with a telescope hitched to computerized instruments. The bird started as a dark speck more than a quarter of a mile up and, when called, shot down to falconer Tom J. Cade at the Peregrine Fund in Boise, Idaho. "It's one of the most remarkable sights," Tucker says. Details were posted online June 11 in the JOURNAL OF EXPERIMENTAL BIOLOGY.

"You can take a chicken and drop it out of an airplane, and it's going to go awfully fast," he points out. Although he had expected falcons to show more finesse than falling chickens, he was surprised to see three distinct stages of descent: acceleration, then controlled, steady dropping, and finally braking. "It decelerates faster than you [could] in your car in a panic stop," he says. —*S.M.*

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