

Brane Teaser

String theorists claim there are at least nine dimensions to the universe. So why is our world in only three?

String theory describes subatomic particles as infinitesimally tiny bits of vibrating string. It also predicts extra spatial dimensions, which are hidden because they are tightly curled up or because matter and forces are barred from them.

Nothing in the theory dictates the number of accessible dimensions, though. Now, Andreas Karch of the University of Washington, Seattle, and Lisa Randall of Harvard University have done an analysis that they say shows why a 3D world is the most likely. The researchers assumed that the universe began as a nine-dimensional volume filled with surfaces, or "branes," of every possible dimensionality: from 1D strings to 9D hypercubes. As this universe expanded, any branes that collided would be annihilated, like what happens when matter and antimatter meet. But 3D branes may have survived because geometrically they have a harder time "finding" each other, says Randall. The only alternative reality would be 7D branes, which compensate for self-destruction by filling up more space, she and Karch conclude in the October edition of *Physical Review Letters*. But, notes Karch, gravity is too weak in 7D to

The Talk Landscape

Researchers at the Massachusetts Institute of Technology (MIT) have managed to come up with a unique look at urban personal communication by mapping cell phone usage in Graz, Austria. Created with data from subscribers who agreed to allow their phones to be monitored, the map is part of MIT's Mobile Landscapes project, which generates images that can be overlaid on city maps to "visualize the full dynamics of a city in real time," according to MIT architect and engineer Carlo Ratti. The continuously changing displays, on view at the Kunsthaus Graz exhibit hall until January, will generate "new possibilities for urban studies and planning," he says. The big red hump marks the Dietrichsteinplatz, a major tramway intersection.



hold planets in orbit.

Theoretical physicist David Tong of Cambridge University in the U.K. says the researchers have yet to explain how gravity—the one force that can radiate into extra dimensions—becomes confined to the 3D brane. But if that can be worked out, Tong thinks brane evolution could be a fruitful new line of research.

A Lying Matter

Rather than longer noses, compulsive liars have about 25% more white matter in the prefrontal cortex, according to a study at the University of Southern California (USC) in Los Angeles.

Researchers have long known that brain activity changes, causing peripheral symptoms such as sweating, during the act of lying. But the new study is the first to look at pathological liars and whether they exhibit differences in brain structure.

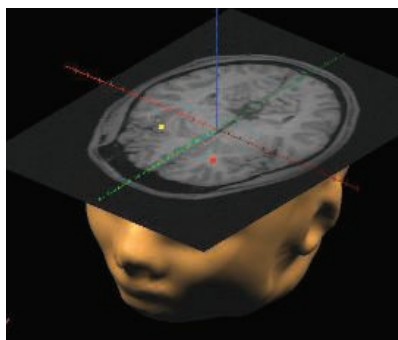
A team led by Adrian Raine and Yaling Yang, neuroscientists at USC, used magnetic resonance imaging to compare brain structures in 12 pathological liars, 16 people with antisocial problems other

than lying, and 21 normal controls. The liars had more white matter—the fibers connecting neurons—in areas behind the forehead responsible for personality, judgment, and complex planning, the team reports in the October issue of the *British Journal of Psychiatry*.

Raine says more white matter implies more neural connectivity. That, he speculates, may facilitate lying, which is "harder than telling the truth." But the liars also had about 15% less gray matter

in the region, meaning they have fewer neurons—possibly relating to "disinhibited, anti-social behavior," says Raine.

The study may have "profound consequences for the way we view immoral [behavior]," says Sean

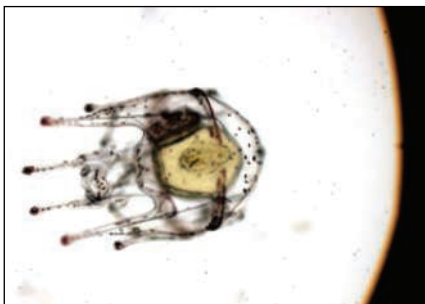


Cutaway skull showing brain of chronic liar.

Spence, a psychiatrist at the University of Sheffield, U.K., because it shows that a fundamental moral quality "is constrained by biology." Whether lying changes the brain—or whether brain peculiarities make one more prone to lying—is still an open question.

Mini-Explorer

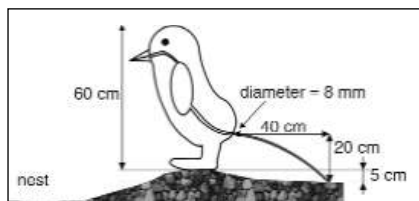
This photo, entitled "A space shuttle exploring the moon," is actually a picture of a 24-day-old, eight-armed sea urchin larva (*Paracentrotus lividus*) in a petri dish. The image, by Italian biologist Rosa Bonaventura, won first prize last month in a contest organized by Marine Genomic Europe, a 16-country research network.



AWARDS

The IgNobels. Although bypassed by Swedish authorities, artificial dog testicles and a study of how penguins poop collected IgNobel Prizes last week at a ceremony in Cambridge, Massachusetts. Half of the 10 awards, given out by the *Annals of Improbable Research* for accomplishments "that cannot or should not be reproduced," went to researchers from Australia or New Zealand.

John Mainstone and the late Thomas Parnell of the University of Queensland, Australia, won the physics prize for patience: Since 1927, the team has monitored one



drop of sticky black pitch dripping through a funnel every 9 years. Edward Cussler and Brian Gettelfinger of the universities of Minnesota and Wisconsin captured the chemistry award for determining that people can swim as fast in syrup as in water.

A team from Germany, Finland, and Hungary, who calcu-

Thinking big. Britain's Environment Agency (EA) has named its first chief scientist and asked him to think more about long-term research questions. Toxicologist Michael Depledge, who has studied endocrine disrupters and continues to do research at Oxford University and at the Plymouth Environmental Research Centre in the southwestern U.K., got the new title last week after the agency agreed with a review he led last year that concluded the agency needs to look farther down the road.

"I like to straddle the boundary" between academic science and action, says Depledge, who also leads EA's 200-person scientific staff. Topics on his study list include nanotechnology, air pollution, mixed chemical effluents, genotoxicity, climate change, and poverty-linked environmental harm.



lated that penguins build up 450 mm Hg of pressure in their bellies to expel excrement the consistency of olive oil away from their nests, could not obtain visas to attend the ceremony. "Let's hope it had nothing to do with the explosive nature of our work," they said in a videotaped acceptance speech.

Physics prizes. Mike Gillan of University College London (UCL) last week won the Dirac Medal, the U.K.'s highest honor for theoretical physics. The prize, from the

Institute of Physics, recognizes his work on computer simulations to solve many-body quantum mechanical problems, including a calculation of the constraints on the temperature and composition of Earth's core.

The institute's Guthrie Medal goes to Marshall Stoneham, also from UCL, for research in areas from quantum-mechanical defects in semiconductors to the sense of smell. Stoneham, former chief scientist at the U.K. Atomic Energy Authority, is working on a room-

temperature quantum computer—an idea often met with "looks of disbelief," he says.

The Glazebrook Medal goes to Andrew Taylor, head of the ISIS facility at the Rutherford Appleton Laboratory, for his contributions to neutron-scattering physics.

THEY SAID IT

"Darwin pulled off quite a feat, and it remains one of the very great works of intellectual history."

—Cardinal Christoph Schönborn, the Roman Catholic archbishop of Vienna, in a lecture last week. Schönborn offered his remarks as a clarification to a 7 July op-ed he wrote in *The New York Times* that argued in favor of intelligent design.

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CELEBRITIES

Toxic award? Harvard's School of Public Health (HSPH) has stirred controversy by awarding its top honor to celebrity activist Erin Brockovich-Ellis (below). As a file clerk at a law firm, Brockovich-Ellis uncovered a case of industrial pollution that led to a \$333 million settlement in 1996 and inspired an eponymous Hollywood blockbuster. But critics say the award endorses a "symbol of junk science."



Facilities owned by Pacific Gas and Electric leaked the carcinogen chromium-6 into drinking water for decades. In an invitation to the 18 October awards ceremony, HSPH Dean Barry Bloom lauded Brockovich "for her efforts on behalf of all of us, and especially the residents of Hinkley, California, whose health was adversely affected by toxic substances dumped by a utility company."

But Harvard physicist Richard Wilson, who has studied arsenic poisoning in Bangladesh, objects: "If you have the dean saying that this harmed the residents of Hinkley, that's false." And Elizabeth Whelan, an HSPH alumna and president of the American Council on Science and Health, who is boycotting the ceremony, says there's no evidence that ingesting chromium-6 causes cancer.

Brockovich gets an endorsement from Lynn Goldman of Johns Hopkins School of Public Health in Baltimore, Maryland, however, who points out that chromium-6 can be carcinogenic when inhaled, say from water vapors.

CREDITS (TOP TO BOTTOM): PLYMOUTH MARINE LABORATORY; VICTOR BENNO; MEYER-ROCHOW; JOZSEF GAL; POLAR BIOL 27 (2003); ERIN BROKOVICH-ELLIS