



◀ **Love hurts.** Some capuchin monkeys may test their social bonds by poking each other in the eye.

ANTHROPOLOGY

Probing Culture's Secrets, From Capuchins to Children

LONDON—Scientists once designated culture as the exclusive province of humans. But that elitist attitude is long gone, as evidenced by a recent meeting* here on how culture, usually defined as the passing on of traditions by learning from others, arises and changes. The 700 attendees, a mixture of researchers and members of the public, heard talks on cultural transmission in fish, meerkats, birds, and monkeys, as well as in extinct and living humans. Researchers probed questions such as what sparks cultural trends and how complex traditions are transmitted, and most agreed that studies of both animals and children will provide important clues. “The field of cultural evolution ranges from fish to humans and includes child development,” says meeting co-organizer Andrew Whiten, a psychologist at the University of St. Andrews in the United Kingdom.

But why do certain cultural trends, such as fashions, begin and catch on? Even science finds it hard to answer that question. At the meeting, anthropologist Susan Perry of the University of California (UC), Los

Angeles, described her team’s work observing white-faced capuchin monkeys since the early 1990s at several sites in Costa Rica. The monkeys have adopted a number of local traditions, some directly related to foraging for food, such as either cracking or rubbing woody capsules of *Luehea* fruits to get out their seeds. But other traditions have no clear survival purpose, such as sniffing each other’s fingers and inserting them into a companion’s nose, or biting off a big chunk of another monkey’s fur and holding it in the mouth while he or she playfully tries to get it back. Although foraging traditions tend to be long-lasting, Perry has found that, perhaps like some human fashions, these more mysterious capuchin trends tend to last only about 10 years or so before fading.

In one group of capuchins, the team’s long-term observations have allowed them to witness a rare event: the emergence of a new tradition. In what Perry calls a “bizarre” and “high-risk” ritual, the monkeys poke each other’s eyeballs. One monkey will insert his or her long, sharp, dirty fingernail deep into the eye socket of another animal, between the eyelid and the eyeball, up to the first knuckle. In videos Perry played for the meeting, the monkeys on the receiving

end of the fingernail, typically social allies, could be seen to grimace and bat their eyelids furiously (as did many members of the audience) but did not attempt to remove the finger or otherwise object to the treatment. Indeed, during these eye-poking sessions, which last up to an hour, monkeys insisted on the finger being reinserted if it popped out of the eye socket.

Why would the monkeys do something potentially dangerous? Perry suggests that capuchins, which, like humans, are highly cooperative and live in large groups, use this apparently pain-inflicting behavior to test the strength of their social bonds. Back in the 1970s, evolutionary biologist Amotz Zahavi of Tel Aviv University in Israel suggested that some animals engage in certain behaviors to solidify alliances, and researchers have observed some examples. For example, some male baboons will hold each other’s testicles before teaming up to fight higher-ranking individuals, apparently to establish trust before going into battle.

When it comes to the capuchins, “this is a plausible hypothesis,” Whiten says, especially because more functional explanations do not seem to explain the eye poking. Nevertheless, Whiten adds, “it is difficult to test directly.”

Perry notes that capuchin behaviors such as eye poking and cracking fruit capsules are true traditions, but they don’t ratchet up into the kinds of complex culture prevalent in every human society, from language to literature to sophisticated technology. Animal traditions lack this cumulative cultural evolution.

How do humans wind up the cultural ratchet? At the meeting, Derek Lyons, a developmental psychologist at UC Irvine, presented new data on a phenomenon in young children that he and others think may be key to humans’ faithful transmission of complex culture: “overimitation,” or the tendency to copy the actions of an adult even when they are unnecessary for achieving a goal. No other animal has been shown to copy in this way, Lyons and others say.

Lyons’s work builds on a landmark 2005 study by Whiten and primatologist Victoria Horner, now at Emory University in Atlanta. They demonstrated that when young chimpanzees and children are shown how to retrieve a reward from a box using a series of both relevant and irrelevant steps, the chimps skipped the unnecessary steps, whereas children tended to imitate everything. Recent work by another team

*Culture Evolves, 28–30 June, London, sponsored by the Royal Society and the British Academy. See www.cultureevolves.org.

suggests that overimitation is universal in human children (<http://news.sciencemag.org/sciencenow/2010/05/kids-overimitate-adults-regardle.html>). Lyons and his co-workers reported further work in 3- to 5-year-old children in 2007 in the *Proceedings of the National Academy of Sciences*. For example, children were shown how to retrieve toy turtles from transparent plastic containers using irrelevant steps such as tapping the container with a feather and relevant steps such as opening the container's door. The children continued to overimitate even when they were led to believe that the experiment was over or when they were explicitly told to avoid "silly" extra steps.

Why do children do this? In London, Lyons played a new series of videotaped experiments with children of the same ages in which he attempted to, as he put it, "snap them out of" their overimitative tendencies. In one experiment, a puppet orangutan named Felix, stationed at an opening on the other end of the box, competed with the children to see who could get the toy turtle out of the box first. Again, Lyons showed each child how to get the turtle while mixing in irrelevant actions such as tapping the box and pushing unnecessary levers. The children, who could not see what Felix

was doing, continued to perform most of Lyons's irrelevant actions, even when Felix kept winning and getting the turtle.

The only way to avoid overimitation, Lyons found, was to convey that one of his actions was unintentional. When he pretended to get a call from his mother on his cell phone and "accidentally" flipped a useless lever while gesturing during the supposed conversation, the children did not flip that lever.

These findings are inconsistent with earlier hypotheses that children overimitate to please adults, Lyons said. Rather, he concluded, they support something he called "automatic causal encoding" (ACE), in which a child assumes that the adult knows what he or she is doing and that each step in the procedure is necessary. "ACE is an important mechanism kids use to bootstrap their knowledge of complex artifacts," he says. Archaeologist Dietrich Stout of Emory University, who studies prehistoric toolmaking, says ACE may have been important for the cultural transmission of stone-tool technologies in early hominins. "Certain things, like the internal workings of the plastic box or the precise force with which to hit a stone core, are not directly available to the observer," Stout says. He



False moves. Young children trying to get a toy out of this box will "overimitate" adults.

agrees with Lyons that such a strategy is "a logical approach when confronted with a complicated, unfamiliar artifact."

Uta Frith, a cognitive neuroscientist at University College London, concurs. "This is an example of actions for which we cannot see rhyme or reason but which we believe are important and relevant to us," Frith says. "I am persuaded that this is the secret of the evolution of human culture."

—MICHAEL BALTER

ScienceInsider



From the Science Policy Blog

In one of the final chapters of the controversy over the **stolen e-mails from climate scientists**, an independent panel has mostly cleared researchers at the U.K.'s University of East Anglia (UEA) of scientific malfeasance. The panel, led by Muir Russell (right), declared their "rigour and honesty as scientists ... not in doubt." <http://bit.ly/UEAclimate>



Even so, the panel criticized the climate scientists for **failing to show sufficient openness** in their dealings with outside critics. The researchers had complained that it took too much time to respond to requests for information, official or otherwise, and that the results, in most cases, were used to misrepresent their work. But one scientist told *ScienceInsider* that researchers should have regular, "built-in transparency" to their data, which could "actually save time" by making responding to requests easier. "That comes with the added benefit of retaining [public] trust in the science of climate change," he said. <http://bit.ly/climateopen>

Meanwhile, the report came under fire by scientists on both ends of the ideological spectrum. Respected climate scientist John Christy, who

questions humanity's role in climate change, said the panel erred by not interviewing leading **skeptic blogger Steven McIntyre**. And Kevin Trenberth, a stalwart among the climate mainstream, said the report, ordered by UEA, should have had a broader mandate to criticize how quotes from the e-mails were taken out of context. <http://bit.ly/christymerit> and <http://bit.ly/trenberthreview>

The European Union's 27 member states were poised to decline a request from the European Commission, the union's executive body, to provide extra money to cover **cost overruns for the €16 billion ITER fusion reactor project**. The commission must now figure out how to find the extra money, a tall order in a region already reeling from the global financial crisis. <http://bit.ly/iter-funding>

After getting spurned in its controversial effort to offer a science prize, the regime controlling Equatorial Guinea has inked a deal to host an African Union "**science observatory**." <http://bit.ly/eguineaobserve>

In an effort to boost **climate science**, the Chinese government has announced funding for 19 major projects to develop China's earth system models, an investment of roughly \$82 million. <http://bit.ly/chinaclimate>

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