

Chimps may put their own spin on culture

Chimpanzees don't read or watch television, have no interest in sending their kids to school, and show no inclination for religious worship. Still, a range of evidence suggests that these group-living primates devise their own cultural traditions, according to a new synthesis of field and laboratory studies.

The analysis, published in the December CURRENT ANTHROPOLOGY, clashes with the traditional view that attributes culture—a tricky concept to define and study—to humans alone. A minority of investigators has long promoted the idea that chimps and other nonhuman primates, and even whales (SN: 11/28/98, p. 342), invent useful new behaviors and pass them on to kin

and fellow group members, a sign of basic cultural capacities.

"A comparison of chimpanzee and human cultures shows many deep similarities, suggesting that they share evolutionary roots," contend Christophe Boesch and Michael Tomasello, both anthropologists at the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany.

Unlike chimps, however, people pass on knowledge by talking to one another and often assume that others' behaviors are motivated by intentions. These social skills allow humans to modify cultural innovations more quickly and in more varied ways than chimps do, as well as to spread advances over large areas, Boesch

and Tomasello hold.

The two researchers note that up to now they have been "somewhat at odds" over the question of chimp culture. Boesch had asserted that chimp populations pass along cultural traditions of tool use and communication signals; Tomasello had countered that individual chimps living together may independently invent the same useful behavior, such as using a rock to crack nuts.

Current evidence on the daily practices of wild chimps contains many gaps, but it allows for a tentative consensus, the researchers say. They reviewed extensive published material on tool use and other behaviors among African chimp populations in four wildlife areas: Bossou, Gombe, Mahale, and Tai.

Boesch and Tomasello assume that culture involves a set of social learning mechanisms that are used to transmit knowledge to particular individuals. Both chimps and humans exhibit socially learned patterns of activities that last from one generation to the next, they say.

Social influences promote population-specific styles of the same chimp behaviors, the scientists argue. For instance, Tai chimps eat ants by holding a stick with one hand and dipping it among soldier ants guarding their nest entrance. As ants climb the stick, the apes withdraw the tool; with a hand twist, they sweep off insects with their lips.

Gombe chimps also use one hand to place a stick among the same species of soldier ants. But after withdrawing an ant-laden probe, they sweep it through the closed fingers of the free hand and then shove the mass of insects into their mouths. Combined with the use of a longer stick, this procedure more efficiently gathers ants than the one observed at Tai, Boesch and Tomasello say.

"Ant dipping" and other cultural acts arise through emulation, in which an individual observes a behavior and learns how to use it to achieve specific goals, they assert. It's less clear whether chimps ever understand the intended results of another's behavior.

Boesch also reports examples of teaching among Tai chimps. Some mothers leave nuts and stone "hammers" in position near anvils for their infants to use. One mother demonstrated a slowed-down version of nut cracking for her child, and another mother modified her son's positioning of a nut for cracking.

The debate continues. Psychologist Bennett G. Galef Jr. of McMaster University in Hamilton, Ontario, remains unconvinced that chimps teach or accumulate cultural knowledge. But anthropologist William C. McGrew of Miami University in Oxford, Ohio, says that field studies beyond those in the new report demonstrate cultural capacities of not only chimps but macaque monkeys, too. —B. Bower

Asian pollution drifts over North America

Faster than mail traveling from Beijing to Seattle, air pollution and dust from China can speed across the Pacific Ocean and blanket broad swaths of North America, according to measurements made during the past 2 years.

"[This] is the first time that anyone has ever documented that pollution from one continent can make it all the way to a downstream continent," says Dan Jaffe of the University of Washington-Bothell. Jaffe and members of other research teams presented the new data this week at a meeting of the American Geophysical Union in San Francisco.

By the time Asian pollution crosses the Pacific—which takes from 4 to 10 days—it typically does not rival the strength of home-grown grime spewing out of tailpipes and chimneys in North America. Nonetheless, these results provide a vivid demonstration that environmental problems in one country can reach nations on the other side of the globe. "We have to recognize that there is no 'away.' Everybody's garbage goes somewhere," says Jaffe.

The Asian pollution rides over the ocean principally during springtime, when strong winds cut a path to North America. Jaffe's group first detected a clear burst of pollution on March 29, 1997, at a research site located on Cheeka Peak in Washington, near the westernmost tip of the contiguous United States. Measurements of air coming from the Pacific showed a jump in the concentrations of carbon monoxide, hydrocarbons, and other pollutants from fossil-fuel combustion. A meteorological computer model that tracks winds indicated that the polluted air had started in Asia 6 days earlier.

An even larger shipment of Asian pollution arrived in North America late last April. A series of strong dust storms in China lifted 140 million tons of fine soil particles into the atmosphere, where they

were swept up by winds moving east, says Douglas L. Westphal of the Naval Research Laboratory in Monterey, Calif. The dust cloud appeared on satellite images, which showed the plume crossing the Pacific toward North America, he says.

It took a week for the dust to reach western North America, where it turned the sky milky white, says Thomas A. Cahill of the University of California, Davis. In late April, the Asian dust was so thick that the concentrations of fine particles in the air at the usually pristine site of Crater Lake, Ore., equaled 40 percent of the EPA daily allowable limit for the United States.

Along with the dust came measurable quantities of arsenic, copper, lead, and zinc. Air concentrations of these metals rose across the western United States on April 29. At Crater Lake, they reached more than 10 times their typical values, says Cahill. The heavy metals came from smelters in Manchuria, he concludes, because the Asian dust passed over that region before heading toward North America. There are no sources of such pollutants near Crater Lake, Cahill says.

Atmospheric scientists have previously recognized that dust from Asia or Africa can reach North America, but the recent data provide the first firm evidence that pollution travels that far. There are also hints that American pollution sails across the Atlantic Ocean and lands in Europe, but clear-cut proof of that connection has yet to emerge, says Cahill.

The pollutants crossing an ocean typically do not present a threat because their concentrations are small in most cases, say the researchers. "We would expect that there would be low health impacts, generally," says Jaffe. Yet in certain instances, such as the April case, winds can carry substantial quantities of unwanted foreign material across the seas, he says. —R. Monastersky