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## Almost Human, and Sometimes Smarter

By [JOHN NOBLE WILFORD](#)

CHICAGO — Observed in the wild and tested in captivity, chimpanzees invite comparison with humans, their close relatives. They bear a family resemblance that fascinates people, and scientists see increasing evidence of similarities in chimp behavior and skills, making some of them think on the vagaries of evolution.

For some time, paleontologists and evolutionary biologists have known that chimp ancestors were the last line of today's apes to diverge from the branch that led to humans, probably six million, maybe four million years ago. More recent examination shows that despite profound differences in the two species, just a 1.23 percent difference in their genes separates Homo sapiens from chimpanzees, Pan troglodytes.

And certain similarities between the two species, scientists say, go beyond expressive faces and opposable thumbs.

Chimps display a remarkable range of behavior and talent. They make and use simple tools, hunt in groups and engage in aggressive, violent acts. They are social creatures that appear to be capable of empathy, altruism, self-awareness, cooperation in problem solving and learning through example and experience. Chimps even outperform humans in some memory tasks.

"Fifty years ago, we knew next to nothing about chimpanzees," said Andrew Whiten, an evolutionary psychologist at the University of St. Andrews in Scotland. "You could not have predicted the richness and complexity of chimp culture that we know now."

Jane Goodall, a young English woman working in Africa in the 1960s, began changing perceptions. At first, experts disputed her reports of chimps' using tools and social behavior. The experts especially objected to her references to chimp culture. Just humans, they insisted, had "culture."

"Jane suffered early rejection by the establishment," Richard Wrangham, a [Harvard](#) anthropologist, said. "Now, the people who say chimpanzees don't have emotions and culture are the ones rejected."

The new consensus framed discussions in March at a symposium, "The Mind of the Chimpanzee," at the Lincoln Park Zoo here. More than 300 primatologists and other scientists reviewed accumulating knowledge of chimps' cognitive abilities.

After one session, Frans de Waal of [Emory University](#) said that as recently as a decade ago there was still no firm consensus on many of the social relationships of chimps. "You don't hear any debate now," he said.

In his own studies at the Yerkes Primate Research Center at Emory, Dr. de Waal found that chimps as social animals have had to constrain and alter their behavior in various ways, as have humans. It is a part of ape

inheritance, he said, and in the case of humans, the basis for morality. The provocative interpretation was advanced in his recent book, “Primates and Philosophers.”

Other reports shortly before the symposium had elaborated on the abilities of chimps as toolmakers. Jill Pruetz, a primatologist at [Iowa State University](#), described 22 examples of chimps in Senegal making stick spears to hunt smaller primates for their meat. Dr. Goodall was the first to call attention to chimps as hunting carnivores, not strictly [vegetarians](#).

Dr. Pruetz observed several chimps jabbing the spears into hollow tree trunks where bush babies often dwell. Just one attempt was successful. Previously, chimps had been seen using sticks mainly to extract termites from their nests.

A team of archaeologists led by Julio Mercader of the University of Calgary reported finding stones in Ivory Coast that chimps used 4,300 years ago to crack nuts. Today’s chimps have often been videotaped using rocks as a hammer to open nuts. The old stones with starch residues from nuts, the researchers said, were the earliest strong evidence of chimp tool use, and the finding suggested that chimps had learned the skill on their own, rather than copying humans.

Other researchers combine field work showing chimp behavior in natural habitats with laboratory experiments that are created to disclose their underlying intelligence — what scientists call their “cognitive reserve.”

For example, chimps on their own would not sit at a computer responding with rapid touches on the screen as a test of their immediate memory. Videos of their doing just that at Kyoto University in Japan especially impressed the symposium scientists.

Tetsuro Matsuzawa, a Kyoto primatologist, described a young chimp watching as numbers 1 through 9 flashed on the computer screen at random positions. Then the numbers disappeared in no more than a second. White squares remained where the numbers had been. The chimp casually but swiftly pressed the squares, calling back the numbers in ascending order — 1, 2, 3, etc.

The test was repeated several times, with the numbers and squares in different places. The chimp, which had months of training accompanied by promised food rewards, almost never failed to remember where the numbers had been. The video included scenes of a human failing the test, seldom recalling more than one or two numbers, if any.

“Humans can’t do it,” Dr. Matsuzawa said. “Chimpanzees are superior to humans in this task.”

Dr. Matsuzawa suggested that early human species “lost the immediate memory and, in return, learned symbolization, the language skills.”

“I call this the trade-off theory,” he continued. “If you want a capability like better immediate memory, you have to lose some other capability.”

Other experiments at Kyoto’s primate center demonstrated the ability of chimps to recognize themselves and focus attention on others. Masaki Tomonaga, who conducted the tests, said that an infant made eye with its mother at about 2 months and that sometime after the first year was able to maintain a gaze as the mother moved about.

Dr. Tomonaga said such “gaze following” developed in humans about the same age, “though infant humans generally have more complex interactions.”

Misato Hayashi, also from Kyoto, described experiments with infant chimps’ manipulating nesting cups and square and cylindrical blocks. They were slower to learn than humans, but the manual dexterity was there. A human starts stacking blocks shortly after age 1, he said; chimps are almost 3 before getting the hang of it.

In experiments with mirrors, researchers showed that chimps had an awareness of themselves that is absent in monkeys but present in dolphins and all the great apes. Similar tests by Emory scientists showed some self-recognition among elephants.

These behaviors were reported by Dr. de Waal and his associate J. M. Plotnik, who said that they “may suggest convergent cognitive evolution probably related to complex sociality and cooperation well documented in both chimpanzees and elephants.”

Other researchers said that when confronted with problems obtaining food from the other side of a fence, chimps were not only clever on their own and often competitive with a fellow chimp, but they also showed a willingness to cooperate with one another to get the job done.

Brian Hare of [Duke University](#) and the Max Planck Institute for Evolutionary Anthropology in Leipzig, Germany, said bonobos outperformed their chimp relatives in cooperative tasks and shared food more readily.

The emotions of caring and mourning have been observed, as in the case of the chimp mother that carried on her back the corpse of her 2-year-old daughter for days after she had died. After fights between two chimps, scientists said, others in the group were seen consoling the loser and acting as mediators to restore peace.

Devyn Carter of Emory described the sympathetic response to a chimp named Knuckles, who was afflicted with [cerebral palsy](#). No fellow chimp was seen to take advantage of his disability. Even the alpha male gently groomed Knuckles.

Dr. Wrangham of Harvard said the challenge to primatologists working in the field was to learn how much of the behavior and “surplus cognitive capacity” observed in captivity applied in the wild.

The answer seems to vary from one isolated chimp community to another. Scientists said that indicated the role of social learning — picking up skills by emulation — and responses to different opportunities in separate cultures.

At Gombe, the site in Tanzania where Dr. Goodall made a name for herself, the chimps with stick tools are accomplished extractors of termites from their nests. But termite fishing is rare in Bossou, Guinea. At Bossou, and not Gombe, chimps have learned to make use of many other tools, including stones for cracking nuts.

Dora Biro of the University of Oxford in England has studied tool use by chimps at the Bossou site. They fold leaves in a mat to sponge water out of tree hollows and scoop algae off stream surfaces. They collect edible ants with sticks. They take stouter tree branches and pound the juicy palm fiber to a pulp, preparing another favorite food.

Videos of Bossou nutcrackers show adult chimps, often female, placing a nut on a flat stone anvil and slamming

down on it with a smaller rock. Two or three youngsters sit around watching. The adults do not appear to be giving instructions, except by example.

“What we’ve learned is that manipulation of objects begins around 1 year of age,” Dr. Biro said. “If it involves two or three objects, as in cracking nuts, that happens at 3 1/2 to 5 years. If it is not learned by 6 or 7, it will never be acquired.”

At a dense forest in the Congo Republic, Crickette M. Sanz of the Max Planck institute said the chimps seemed as curious about her as she was about them. Groups came forward, calling others to join them. Sometimes, they sat with her for hours, eating fruit, grooming and even mating.

For a more detached study, Dr. Sanz deployed 18 video cameras at remote locations and recorded 84 hours of chimp tool use. Leaf sponging was the simplest, she concluded, and collecting honey with a long stick required the most effort and risk, with termite fishing having “the highest element of success.”

Dr. Sanz, who has worked with her husband, David B. Morgan, on some of the research, described mother chimps’ carefully withdrawing from a hole sticks swarming with black termites while their infants looked on. These social interactions, she said, passed on essential techniques and behaviors to the next generation.

“Socially transmitted adjustable behavior,” Dr. de Waal said, is a hallmark of culture.

Chimp behavior sometimes turns violent, particularly in territorial clashes. In Uganda, John Mitani of the [University of Michigan](#) observed chimp patrols regularly policing the forest boundaries of their communities. One patrol was seen assaulting an adult male, killing and emasculating him.

Kristin Bonnie, another Emory primatologist, said the transmission of behavior could be benign and spontaneous, with the prospect of reward being secondary. “It is the desire to act like others, an identification with certain others,” she explained, citing as an example the way chimps usually clasp hands while grooming each other.

At the symposium, researchers said the interest in learning more about chimps was not just a case of knowledge for the sake of knowledge. Their behavior and intelligence, scientists say, may offer insights into the abilities of early human ancestors like *Australopithecus afarensis*, the apelike “Lucy” species that thrived more than three million years ago. A more urgent motivation for the research, primatologists say, is that these are sentient beings and the closest living relatives of humans, and their survival is threatened.

Elizabeth V. Lonsdorf, a primatologist at the Lincoln Park Zoo and a symposium organizer, said researchers needed “to keep their eyes out for ways to improve the care of chimpanzees.”

Diseases like ebola and anthrax are taking their toll. Hunting chimps for “bush meat” is increasing. Many of the forest habitats of chimps in central Africa are being cut by loggers and land developers. As a result, Dr. Lonsdorf said, “Groups of the animals are getting closer together, which increased the threat of chimp violence and territorial disputes.”

Dr. Goodall recalled that when she went to Africa nearly a half-century ago, at least a million chimps lived in the continent, and “now there are perhaps only 150,000.” In that time, they have impressed scientists with physical

and emotional reminders of their kinship to humans and their occasional triumphs over them at a computer screen.

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