

What was he thinking? Study turns to ape intellect

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In this Dec. 13, 2006 photo provided by the Primate Research Institute of Kyoto University, a 5 1/2-year-old chimpanzee named Ayumu performs a memory test with randomly-placed consecutive Arabic numerals, which are later masked, accurately duplicating the lineup on a touch screen computer in Kyoto, Japan. The young chimpanzees in the study titled "Working memory of numerals in chimpanzees" by Sana Inoue and Tetsuro Matsuzawa could memorize the nine numerals much faster and more accurately than human adults. The evidence that animals are more intelligent and more social than we thought seems to grow each year, especially when it comes to primates. It's an increasingly hot scientific field with the number of ape and monkey cognition studies doubling in recent years, often with better technology and neuroscience paving the way to unusual discoveries. (AP Photo/Primate Research Institute of Kyoto University) PART OF A SEVEN-PICTURE PACKAGE WITH "ANIMAL SCIENCES"

(AP) — The more we study animals, the less special we seem.

Baboons can distinguish between written words and gibberish. Monkeys seem to be able to do multiplication. Apes can delay instant gratification longer than a human child can. They plan ahead. They make war and peace. They show empathy. They share.

"It's not a question of whether they think — it's how they think," says Duke University scientist Brian Hare. Now scientists wonder if apes are capable of thinking about what other apes are thinking.

The evidence that animals are more intelligent and more social than we thought seems to grow each year, especially when it comes to primates. It's an increasingly hot scientific field with the number of ape and monkey cognition studies doubling in recent years, often with better technology and neuroscience paving the way to unusual discoveries.

This month scientists mapping the DNA of the bonobo ape found that, like the chimp, bonobos are only 1.3 percent different from humans.

Says Josep Call, director of the primate research center at the Max Planck Institute in Germany: "Every year we discover things that we thought they could not do."

Call says one of his recent more surprising studies showed that apes can set goals and follow through with them.

Orangutans and bonobos in a zoo were offered eight possible tools — two of which would help them get at some food. At times when they chose the proper tool, researchers moved the apes to a different area before they could get the food, and then kept them waiting as much as 14 hours. In nearly every case, when the apes realized they were being moved, they took their tool with them so they could use it to get food the next day, remembering that even after sleeping. The goal and series of tasks didn't leave the apes' minds.

Call says this is similar to a person packing luggage a day before a trip: "For humans it's such a central ability, it's so important."

For a few years, scientists have watched chimpanzees in zoos collect and store rocks as weapons for later use. In May, a study found they even add deception to the mix. They created haystacks to conceal their stash of stones from opponents, just like nations do with bombs.

Hare points to studies where competing chimpanzees enter an arena where one bit of food is hidden from view for only one chimp. The chimp that can see the hidden food, quickly learns that his foe can't see it and uses that to his advantage, displaying the ability to perceive another ape's situation. That's a trait humans develop as toddlers, but something we thought other animals never got, Hare said.

And then there is the amazing monkey memory.

At the National Zoo in Washington, humans who try to match their recall skills with an orangutan's are humbled. Zoo associate director Don Moore says: "I've got a Ph.D., for God's sake, you would think I could out-think an orang and I can't."

In French research, at least two baboons kept memorizing so many pictures — several thousand — that after three years researchers ran out of time before the baboons reached their limit. Researcher Joel Fagot at the French National Center for Scientific Research figured they could memorize at least 10,000 and probably more.

And a chimp in Japan named Ayumu who sees strings of numbers flash on a screen for a split-second regularly beats humans at accurately duplicating the lineup. He's a YouTube sensation, along with orangutans in a Miami zoo that use iPads.

It's not just primates that demonstrate surprising abilities.

Dolphins, whose brains are 25 percent heavier than humans, recognize themselves in a mirror. So do elephants. A study in June finds that black bears can do primitive counting, something even pigeons have done, by putting two dots before five, or 10 before 20 in one experiment.

The trend in research is to identify some new thinking skill that chimps can do, revealing that certain abilities are "not uniquely human," said Emory University primatologist Frans de Waal. Then the scientists find that same ability in other primates further removed from humans genetically. Then they see it in dogs and elephants.

"Capacities that we think in humans are very special and complex are probably not so special and not so complex," de Waal said. "This research in animals elevates the animals, but it also brings down the humans.... If monkeys can do it and maybe dogs and other animals, maybe it's not as complex as you think."

At Duke, professor Elizabeth Brannon shows videos of monkeys that appear to be doing a "fuzzy representation" of multiplication by following the number of dots that go into a box on a computer screen and choosing the right answer to come out of the box. This is after they've already done addition and subtraction.

This spring in France, researchers showed that six baboons could distinguish between fake and real four-letter words — BRRU vs KITE, for example. And they chose to do these computer-based exercises of their own free will, either for fun or a snack.

It was once thought the control of emotions and the ability to empathize and socialize separated us from our primate cousins. But chimps console, and fight, each other. They also try to soothe an upset companion,

grooming and putting their arms around him.

"I see plenty of empathy in my chimpanzees," de Waal said. But studies have shown they also go to war against neighboring colonies, killing the males and taking the females. That's something that also is very human and led people to believe that war-making must go back in our lineage 6 million years, de Waal said.

When scientists look at our other closest relative, the bonobo, they see a difference. Bonobos don't kill. Hare says his experiments show bonobos give food to newcomer bonobos, even when they could choose to keep all the food themselves.

One reason scientists are learning more about animal intellect is computers, including touch screens. In some cases, scientists are setting up banks of computers available to primates 24-7. In the French word recognition experiment, Fagot found he got more and better data when it was the baboons' choice to work.

Animal cognition researcher Steve Ross at the Lincoln Park Zoo in Chicago agrees.

"The apes in our case seem to be working better when they have that control, that choice to perform," he said.

Brain scans on monkeys and apes also have helped correct mistaken views about ape brain power. It was once thought the prefrontal cortex, the area in charge of higher reasoning, was disproportionately larger than the rest of the brain only in humans, giving us a cognitive advantage, Hare said. But imaging shows that monkey and ape prefrontal cortexes have that same larger scale, he said.

What's different is that the human communication system in the

prefrontal cortex is more complex, Hare said.

So there are limits to what non-human primates can do. Animals don't have the ability to communicate with the complexity of human language. In the French study, the baboons can recognize that the letters KITE make a word because through trial and error they learn which letters tend to go together in what order. But the baboons don't have a clue of what KITE means. It's that gap that's key.

"The boundaries are not as sharp as people think, but there are certain things you can't overcome and language is one of them," said Columbia University animal cognition researcher Herbert Terrace.

And that leads to another difference, Ross said. Because apes lack language skills, they learn by watching and mimicking. Humans teach with language and explanation, which is faster and better, Ross said.

Some of the shifts in scientific understanding of animals are leading to ethical debates. When Emory University researcher Lori Marino in 2001 co-wrote a groundbreaking study on dolphins recognizing themselves in mirrors, proving they have a sense of self similar to humans, she had a revelation.

"The more you learn about them, the more you realize that they do have the capacity and characteristics that we think of as a person," Marino said. "I think it's impossible to ignore the ethical implications of these kinds of findings."

After the two dolphins she studied died when transferred to another aquarium, she decided never to work on captive dolphins again. She then became a science adviser to the Nonhuman Rights Project, which seeks legal rights or status for animals. The idea, Marino said, is to get animals such as dolphins "to be deemed a person, not property."

The intelligence of primates was one of the factors behind a report last year by the Institute of Medicine that said the National Institutes of Health should reduce dramatically the number of chimpanzees it uses in biomedical research.

The NIH is working on new guidelines that would further limit federal medical chimpanzee use down from its current few dozen chimps at any given time, said NIH program planning chief James Anderson. Chimps are a special case, with their use "very, very limited," he said. But he raises the question: "What happens if your child is sick or your mother is dying" and animal research might lead to a cure?

The issue is more about animal welfare and giving them the right "not to be killed, not to be tortured, not to be confined unnecessarily" than giving them legal standing, said David DeGrazia, a philosophy and ethics professor at George Washington University.

Hare says that focusing on animal rights ignores the problem of treatment of chimps in research settings. He contends that for behavioral studies and even for many medical research tests they could be kept in zoos or sanctuaries rather than labs.

Animals performing tasks in near-natural habitats "is like an Ivy League college" for the apes, Hare said. "We're going to see them do stunning and sophisticated things."

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