

Can Animals Think?

By **EUGENE LINDEN** Sunday, Aug. 29, 1999

The first time Fu Manchu broke out, zookeepers chalked it up to human error. On a balmy day, the orangutans at the Omaha Zoo had been playing in their big outdoor enclosure. Not long thereafter, shocked keepers looked up and saw Fu and his family hanging out in some trees near the elephant barn. Later investigation revealed that the door that connects the furnace room to the orangutan enclosure was open. Head keeper Jerry Stones chewed out his staff, and the incident was forgotten. But the next time the weather was nice, Fu Manchu escaped again. Fuming, Stones recalls, "I was getting ready to fire someone."

The next nice day, alerted by keepers desperate to keep their jobs, Stones finally managed to catch Fu Manchu in the act. First, the young ape climbed down some air-vent louvers into a dry moat. Then, taking hold of the bottom of the furnace door, he used brute force to pull it back just far enough to slide a wire into the gap, slip a latch and pop the door open. The next day, Stones noticed something shiny sticking out of Fu's mouth. It was the wire lock pick, bent to fit between his lip and gum and stowed there between escapes.

Fu Manchu's jailbreaks made headlines in 1968, but his clever tricks didn't make a big impression on the scientists who specialize in looking for signs of higher mental processes in animals. At the time, much of the action in animal intelligence was focused on efforts to teach apes to use human languages. No researcher cared much about ape escape artists.

And neither did I. In 1970, I began following studies of animal intelligence, particularly the early reports of chimpanzees who learned how to use human words. The big breakthrough in these experiments came when two psychologists, R. Allen and Beatrice Gardner, realized their chimps were having trouble forming wordlike sounds and decided to teach a young female named Washoe sign language instead. Washoe eventually learned more than 130 words from the language of the deaf called American Sign Language.

Washoe's success spurred more language studies and created such ape celebrities as Koko the gorilla and Chantek the orangutan. The work also set off a fierce debate in scientific circles about the nature of animal intelligence--one that continues to this day. Indeed, it has been easier to defeat communism than to get scientists to agree on what Washoe meant three decades ago when she saw a swan on a pond and made the signs for "water bird." Was she inventing a phrase to describe waterfowl, or merely generating signs vaguely associated with the scene in front of her?

Over the years I have written several articles and two books on animal-intelligence experiments and the controversy that surrounds them. I have witnessed at close range the problems scientists encounter when they try to examine phenomena as elusive as language and idea formation. Do animals really have thoughts, what we call consciousness? The very question offends some philosophers and scientists, since it cuts so close to what separates men from beasts. Yet, notes Harvard's Donald Griffin, to rule out the study of animal consciousness handicaps our understanding of other species. "If consciousness is important to us and it exists in other creatures," says Griffin, "then it is probably important to them."

Frustrated with what seemed like an endless and barren ideological debate, I began to wonder whether there might be better windows on animal minds than experiments designed to teach them human signs and symbols. When I heard about Fu Manchu, I realized what to me now seems obvious: if animals can think, they will probably do their best thinking when it serves their purposes, not when some scientist asks them to.

And so I started exploring the world of animal intelligence from the other side. I started talking to people who deal with animals professionally: veterinarians, animal researchers, zookeepers--people like Jerry Stones. Most are not studying animal intelligence per se, but they encounter it, and the lack of it, every day.

Get a bunch of keepers together and they will start telling stories about how their charges try to outsmart, beguile or otherwise astonish humans. They tell stories about animals that hoodwink or manipulate their keepers, stories about wheeling and dealing, stories of understanding and trust across the vast gulf that separates different species. And, if the keepers have had a few drinks, they will tell stories about escape.

Each of these narratives reveals another facet of what I have become convinced is a new window on animal intelligence: the kind of mental feats they perform when dealing with captivity and the dominant species on the planet--humanity.

What Do You Want for That Banana? captive animals often become students of the humans who control their lives. The great apes in particular are alert to situations that might temporarily give them the upper hand--for example, when something useful or valuable rolls into their exhibit or is left behind. The more worldly animals recognize the concept of value as meaning "something I have that you want," and they are not above exploiting such opportunities for all they are worth.

Consider the time that Charlene Jendry was in her office at the Columbus Zoo and word came to her that a male gorilla named Colo was clutching a suspicious object. Arriving on the scene, Charlene offered Colo some peanuts, only to be met with a blank stare. Realizing that they were negotiating, Charlene upped the ante and offered a piece of pineapple. At this point, without making eye contact with Charlene, Colo opened his hand and revealed that he was holding a key chain, much in the manner that a fence might furtively show a potential customer stolen goods on the street. Relieved that it was not anything dangerous or valuable, Charlene gave Colo the piece of pineapple. Astute bargainer that he was, Colo then broke the key chain and gave Charlene a link, perhaps figuring, "Why give her the whole thing if I can get a bit of pineapple for each piece?"

If an animal can show some skill in the barter business, why not in handling money? One ape, an orangutan named Chantek, did just that during his years as part of a study of sign language undertaken by psychologist Lyn Miles at the University of Tennessee. Chantek learned more than 150 words, but that wasn't all. He also figured out that if he did chores such as cleaning up his room, he could earn coins that he could later spend on treats and rides in Lyn's car.

Chantek's understanding of money seems to have extended far beyond simple transactions to such sophisticated concepts as inflation and counterfeiting. Lyn first used poker chips as the coin of the realm, but Chantek decided that he could expand the money supply by breaking the chips in two. When Lyn switched to using washers, Chantek found pieces of aluminum foil and tried to make imitation washers that he could pass off as the real thing. Lyn also tried to teach Chantek more virtuous habits such as saving, sharing and charity.

When I caught up with the orangutan at Zoo Atlanta, where he now lives, I did not see evidence of charity, but I did see an example of sharing that a robber baron might envy. When Lyn gave Chantek some grapes and asked him to share them with her, Chantek promptly ate all the fruit. Then, seemingly remembering that he'd been asked to share, handed Lyn the bare stem.

What does this tell us? We have been equipped by nature for tasks like juggling numbers and assigning value to things, but these signal human abilities may also be present in more limited form in our closest relatives. Chimps engage in sharing, trading and gift giving in the wild, and they more than hold their own in the primitive bazaar of the zoo.

Lend a Helping Tail why would an animal want to cooperate with a human? The behaviorist would say that animals cooperate when, through reinforcement, they learn it is in their interest to cooperate. This is true as far as it goes, but I don't think it goes far enough. Certainly with humans, the intangible reinforcement that comes with respect, dignity and accomplishment can be far more motivating than material rewards.

Gail Laule, a consultant on animal behavior with Active Environments Inc., uses rewards to encourage an animal to do something, but also recognizes that animals are more than wind-up toys that blindly respond to tempting treats. "It's much easier to work with a dolphin if you assume that it is intelligent ... That was certainly the case with Orky," says Laule, referring to her work with one of the giant dolphins called orcas or killer whales. "Of all the animals I've worked with, Orky was the most intelligent ... He would assess a situation and then do something based on the judgments he made."

Like the time he helped save a member of the family. Orky's mate Corky gave birth in the late 1970s, but the baby did not thrive at first, and the keepers took the little killer whale out of the tank by stretcher for emergency care and feeding. Things began to go awry when they returned the orca to the tank. The boom operator halted the stretcher when it was still a few feet above the water. Suddenly the baby began throwing up, through both its mouth and its blowhole. The keepers feared it would aspirate some vomit, which could bring on a fatal case of pneumonia, but they could not reach the baby dangling above.

Orky had been watching the procedure, and, apparently sizing up the problem, he swam under the stretcher and allowed one of the men to stand on his head. This was remarkable, says Tim, since Orky had never been trained to carry people on his head like Sea World's Shamu. Then, using the amazing power of his tail flukes to keep steady, Orky provided a platform that allowed the keeper to reach up and release the bridle so that the 420-lb. baby could slide into the water within reach of help.

The Keeper Always Falls for That One a sad fact of life is that it is easier to spot evidence of intelligence in devious behavior than in acts of cooperation or love. Sophisticated acts of deception involve the conscious planting of false beliefs in others, which in turn implies awareness that others have mental states that can be manipulated. British psychologist Andrew Whiten of the University of St. Andrews in Scotland says this ability is a "mental Rubicon" dividing humans and at least the other great apes from the rest of the animal kingdom.

While psychologists have studied various forms of animal deception, zookeepers are its targets every day. Helen Shewman, of the Woodland Park Zoo in Seattle, Wash., recalls that one day she dropped an orange through a feeding porthole for Meladi, one of the female orangutans. Instead of moving away, Meladi looked Helen in the eye and held out her hand. Thinking that the orange must have rolled off somewhere inaccessible, Helen gave her another one. When Meladi shuffled off Helen noticed that she had hidden the original orange in her other hand.

Tawan, the colony's dominant male, watched this whole charade, and the next day he too looked Helen in the eye and pretended that he had not yet received an orange. "Are you sure you don't have one?" Helen asked. He continued to hold her gaze and held out his hand. Relenting, she gave him another, then noticed that he had been hiding his orange under his foot.

We Gotta Get Outta This Place while all sorts of animals have tried to break out of captivity, orangutans are the master escape artists of the menagerie. Besides picking locks, oranges have been known to make insulating mitts out of straw in order to climb over electric fences. Indeed, oranges have become design consultants: some zookeepers have used them to test new enclosures on the theory that if an orang can't find a way out, no other species of ape will. How do the oranges do it? One ingredient of success may be a patient, observing temperament. Zoologist Ben Beck once noted that if you give a screwdriver to a chimpanzee, it will try to use it for everything except its intended purpose. Give one to a gorilla, and it will first rear back in horror--"Oh, my God, it's going to hurt me!"--then try to eat it, and ultimately forget about it. Give it to an orangutan, however, and the ape will first hide it and then, once you have gone, use it to dismantle the cage.

Along with Fu Manchu's crafty getaways, the most memorable orang escapes include a breakout at the Topeka Zoo. Jonathan, a young male, had been temporarily isolated in a holding area and resented it mightily. Keepers were not particularly worried because his cage was secured with an elaborate "guillotine" door that opened vertically and was remotely controlled by pneumatic pressure. When the door was closed, its top fit between two plates. As an extra precaution, a keeper would insert a pin through keyhole-like apertures in the plates and in the top of the door. The 5-in. pin would then be flopped over so that it could not be withdrawn without being flipped into the proper position. Taken together, these redundant security systems should have been able to contain most humans, much less an ape.

Nonetheless, a volunteer who regularly came to play with an infant orang in a neighboring cage began reporting that she could see Jonathan fiddling with something at the top of his cage. Geoff Creswell, a keeper, investigated, but when he looked in on the orang, Jonathan was always sitting quietly in a corner. Always, that is, until the day Creswell had a sudden, heart-stopping encounter with the big male outside his cage in a corridor of the holding area. After Jonathan had been put back behind bars, the keepers discovered that he had used a piece of cardboard to flip the pin into position so that it could be pushed out.

Jonathan's escape offered evidence of a panoply of higher mental abilities. He concealed his efforts from the humans in charge of him (but seemed not to realize that the person visiting the next cage might snitch on him); he figured out the workings of the locking mechanism and then fashioned a tool that enabled him to pick the lock. Perhaps most impressive was the planning and perseverance that went into this feat.

Sally Boysen, a psychologist at Ohio State University, probed the degree to which a chimp's ability to reason is subservient to the animal's desires. Her experiment involved two female chimps, Sheba and Sarah, and centered on a game in which Sheba would be shown two dishes filled with different amounts of treats. The first dish Sheba pointed to would be given to Sarah, meaning that Sheba had to think smaller to get larger. When she could actually see the treats, Sheba invariably pointed to the larger amount, only to see them given to Sarah. However, when tokens were substituted for real food, Sheba quickly realized that pointing to the smaller amount would get her the larger amount. It would seem that in the presence of real food, Sheba's appetites persistently overcame her ability to reason. When temptation was removed, Sheba could bring her cognitive abilities to bear and achieve her desired, albeit selfish, goal.

The same experiment was conducted with children. Four-year-olds realize that if they point to a smaller amount of food, they will be rewarded with more. Three-year-olds don't. This suggests that sometime during human maturation, children's cognitive abilities develop to the point that they realize they can be rewarded for restraint. The evidence also suggests that Sheba and other chimps are right on the cusp of that threshold. "In the course of an afternoon, we could toggle

between Sheba reacting like a three-year-old and a four-year-old simply by switching what she was looking at," says Boysen.

Even if intelligence is shackled in animals, we can see it break out in flashes of brilliance. Countless creatures draw on their abilities not only to secure food and compete with their peers, but also to deal with, deceive and beguile the humans they encounter. Every so often, they do something extraordinary, and we gain insight into our own abilities, and what it's like to be an orangutan or an orca.

What is intelligence anyway? If life is about perpetuation of a species, and intelligence is meant to serve that perpetuation, then we can't hold a candle to pea-brained sea turtles who predated us and survived the asteroid impact that killed off the dinosaurs. As human history has shown, once minds break free of religious, cultural and physical controls, they burn hot and fast, consuming and altering everything around them. Perhaps this is why higher mental abilities, though present in other creatures, are more circumscribed. Still, it is comforting to realize that other species besides our own can stand back and appraise the world around them, even if their horizons are more constrained than the heady, perilous perspective that is our blessing and curse.