WE ARE ALL EARTHLINGS: THE INTELLIGENCE OF ANIMALS

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Have you ever looked into the eyes of your dog, cat, horse, parakeet, or iguana, said "I Love you", then wondered if your words had registered? What is he thinking? Does she love me too? Popular cartoons and internet videos make it easy to put thoughts into animals' minds and words to their lips, but what is REALLY going on inside those noggins?

THE GOLD STANDARD

For a long time the gold standard for intelligence was human beings. Certain human abilities were considered to separate us from the animals, to make us special and better. God gave us dominion over animals, after all. So philosophers, theologians, and scientists wanted to justify that.

PONDERING ANIMAL THOUGHT

The Ancients

The Greeks thought about animal intelligence a lot. Guys with names like Xenophon and Alcamaeon of Croton opined that while man has rationality, animals only have perception. Aristotle conceded that they have the knowledge needed to cope with their environment, but not the ability to reason. On a more positive note, Alexander thought that building nests & dams meant that animals must be able to think. And Porphyry came up with a new angle. The problem, he said, is not that animals lack minds but that humans lack the capacity to understand their minds.

Meanwhile, the Egyptians didn't recognize a difference between humans and animals in the first place. Animals were considered the earthly representation of the gods. The Romans had less to say about animals, but Plato did say that humans who do not use rational thought are no better than beasts.

17th Century

The French philosopher Rene Descartes believed that our ability to think proves we have a soul. But he got himself into a jam when it came to animals. Believing that animals had a soul would've been heresy in the religious thinking of his time, so he had to conclude that animals could not think. When presented with examples of animals performing above the capabilities of humans, he said "the very perfection of the animal's acts render it less likely that it thinks!" A logical contradiction. But he was good at geometry.

HOW ANIMALS SOLVE PROBLEMS

Puzzle Box

Edward Thorndike in the 1800s invented a puzzle box to study animal intelligence. The animal had to operate a series of levers, strings, and buttons to escape and get food. At first the animal moves about randomly and eventually triggers the right sequence by accident. Then over time, it learns what works and what does not, and gets out faster. Thorndike recorded time to escape and plotted a "learning curve". The learning curves of cats & dogs are always gradual. If an animal has an 'aha' moment, suddenly gaining insight, escape time should drop sharply at that point. That never happens in cats, dogs, or chickens. Thorndike concluded that animals learn unconsciously by trial and error, not by having "insight". But Thorndike didn't test monkeys!

In 1917 Wolfgang Kohler published The Mentality of Apes (1917). Köhler observed that chimpanzees will stack boxes in order to reach a banana suspended from the ceiling, and they do it after quiet study not after a lot of running around and pawing at things. Likewise they will use a stick to draw food to them if it's beyond the reach of their arms. Köhler showed that chimps have "insight". Recent research has shown that dolphins have it too!

Self Awareness

Paint something onto an animal's face or chest that can only been seen in the mirror. If when looking in the mirror, the animal touches ITSELF rather than the mirror image, then this indicates that the animal realizes it is seeing itself in the mirror. Chimps, elephants, dolphins, & parrots pass this test. Dogs & cats do not.

PRIMATES CHATTING IT UP

We know that chimps can solve problems by insight, can use tools, and have self-awareness. That brings them close to the gold standard of human intelligence. But what about language? That's unique to humans, right?

The earliest studies of ape language tried to teach chimpanzees how to speak, that is to make the same sounds that humans make. These studies were a flop. Chimpanzees lack the vocal apparatus needed to speak language. So it's important to test intelligence using the capabilities an animal possesses, and human researchers have experienced a learning curve of their own in coming up with more sophisticated methods.

In 1965, Allen & Beatrix Gardner had the idea to try sign language, because the hands of chimps are very much like ours. Voila! The first primate to learn sign language was Washoe the Chimp. The Gardners raised her just like you would a human child, with books & toys, eating and traveling by car with the family. They started out by rewarding her with food & tickle sessions for learning a sign, but they soon discovered that just like a human child, the best motivation was Washoe's natural desire to communicate. Eventually Washoe learned 350 signs.

When new chimps came to live with her, she helped teach them the signs. She and others also put known signs together to express new concepts. For example: "thermos" was "metal cup drink". And when new students came to work with Washoe, she would slow down her rate of signing for the novice speakers of sign language. A humbling experience for them.

Koko the gorilla was the second famous primate to learn sign language. Teaching Koko sign language began as a Ph.D. project for Penny Patterson, a grad student at Stanford University, and it became her life's work. Koko is reported to have learned 1000 signs and like Washoe could invent new words by stringing together old ones. For example: "ring" = "finger" "bracelet". She had many books & films created about her, and she became known for her love of cats and her famous visitors such as Robin Williams & Sting. Koko passed away in mid 2018 at the age of 47.

Despite their ability to express knowledge and feeling with signs, neither Washoe nor Koko ever spoke full sentences with grammar such as humans do. They said things like "You me out go", and "Time eat". Another interesting limitation of primate language is that, although they understand and answer questions, it seems primates never ASK questions. Even something obvious like "Where's my kitten?" Compare this to human children who never stop with the questions.

DOLPHINS ARE WHIZZES … AND WHISTLERS!

Dolphins surpass dogs & cats in their ability to solve puzzles. In one experiment, dolphins were taught to collect weights scattered around their pool which they had to place on top of a box in order to release a food reward. Although taught to retrieve & stack one at a time, when left alone to complete the task they collected all of the weights at the same time which got them the food a lot faster. Aha!

Dolphins communicate with whistles & chirps and can mimic new sounds. When put in a situation where pressing a button delivers a whistle and a toy, they learn to associate a particular whistle with a particular toy, and will repeat that whistle when the toy is shown to them. Researchers at the KTH Royal Institute of Technology in Stockholm plan to use artificial intelligence to create a complete dolphin-language dictionary by the year 2021. They hope to show that dolphins know more than 50 words of Dolphinish.

ELEPHANTS COOPERATE & RESCUE

Elephant brains have as many cortical nerve cells and connections as human brains do, they are believed to rank equal to dolphins in terms of problem-solving abilities, and they are equal to great apes in terms of tool manufacture & use. But SOCIAL cognition is where elephants really shine! They are better than chimps on tasks requiring cooperation. In one such task, two animals must simultaneously pull on ropes attached to either end of a cylinder holding food, in order to open the cylinder. They figure this out faster than chimps do. "Elephants also do better than primates at empathy and rescue", says Josh Plotnik, head of elephant research at the Golden Triangle Asian Elephant Foundation in Thailand. Elephants empathize, they help each other, and they work together.

Aristotle described the elephant as “The animal that surpasses all others in wit and mind.”

DOGS GET THE POINT!

Apart from learning tricks and serving man in an amazing variety of important jobs, there is one thing that sets dogs apart from even chimpanzees in intelligence. Dogs are the only non-human animal who understands what it means to point at something! Laurie Santos, a psychologist at Yale University: “They understand that people are trying to communicate information and use such communicative signals way better than primates do.” Chimpanzees don’t look past the tip of an outstretched finger when a human points them in the direction of food, but a dog can use pointing as well as eye-direction cues to locate objects in the distance. Dogs are also good at understanding human language. One famous border collie named Chaser knows 1000 words of English!

THE CAT’S MEOW!

Ah the age old question: Who is smarter? No surprise that dogs beat cats at working with humans. Cats are not as sociable and they don’t easily tolerate frustration. If an activity isn’t immediately rewarding, they move on. That said, cats are far more dexterous with their paws than dogs and we know that manual dexterity is a key element of human and primate intelligence. In one study of wild carnivores using a puzzle-box, the feline species did better than the canine species, the wild cats succeeding almost 30% of the time while the wild dogs only succeeded 24% of the time. And when it comes to communication, cats have developed something very special just for their human companions: The “meow”! Adult cats do not meow to each other, only to humans! Their wild relatives don’t meow either, beyond early infancy. Domestic cats can communicate wishes & feelings by modulating the tone and timing of their meows.

BRAINY BIRDS

Despite the small absolute size, bird brains are densely packed with neurons! Bird do amazing things like flying through dense forests without smacking into a tree branch. That alone is worthy of note. But recent research has shown that two major bird families, the crows & the parrots, are capable of cognitive feats equal to primates. Crows make & use a hook tool crafted from twigs by trimming and sculpting a functional hook which they then use to poke insect larvae from holes in trees. Magpies pass the self-awareness test! Place a colored sticker on the bird’s chest and then put it in front of a mirror. A magpie will peck at the sticker ONLY after seeing it in the mirror (not before … that is, it’s NOT feeling the sticker stuck to its feathers).

A PARROT NAMED “ALEX”

An African Gray Parrot named “Alex” became famous as the first bird to use language. A researcher named Irene Pepperberg used special training methods and was careful not to accidentally “cue” him for answers. By the time he was 30 years old, Pepperberg claimed that Alex could add and subtract, count to six, identify objects and colors, and sometimes made up

names like “banerry” for apples—banana plus cherry. He also used language to express his emotions. Once when he had to stay overnight at the vet’s office, he said “I’m sorry, come here, wanna go back.” Finally, according to Pepperberg Alex did something no primate has done – He asked questions!

SO, ARE HUMANS REALLY ‘THE GOLD STANDARD’ ?

Researchers now believe that animal intelligence isn’t a matter of how closely related they are to humans. Dolphin brains look nothing like ours, and bird brains are structured differently too. When animals achieve the same capabilities without being related to each other, that’s called “convergent evolution”. There are many examples of this from the brilliant dolphin down to the lowly octopus, and we’re only now learning how much we did not know before. The 20th century philosopher Ludwig Wittgenstein said:

“IF A LION COULD TALK, WE WOULD NOT UNDERSTAND HIM”

But maybe that’s starting to change!

ADDITIONAL READING

A FUN INTRODUCTION TO THE EARLY RESEARCH
https://www.amazon.com/Animal-IQ-Human-Side-Animals/dp/B0027V2VBQ/ref=sr_1_2?ie=UTF8&qid=1544514905&sr=8-2&keywords=the+human+side+of+animals

GREEKS ON ANIMAL INTELLIGENCE
https://janetthomas.wordpress.com/2013/02/07/the-ancient-view-of-animals/

CHASER THE BORDER COLLIE
https://www.usatoday.com/story/news/nation/2013/11/24/smart-dog-border-collie-learns-language-grammar/3691967/

CROWS
http://science.sciencemag.org/content/306/5703/1903?ijkey=0a1e2bb2b5317b82b047e56aa3dc51af6f9c5356&keytype2=tf_ipsecsha

WIKIPEDIA
Articles on animal cognition, Washoe, Koko, Alex, elephants & dolphins