Alex, an African gray parrot, had a large vocabulary and was able to answer questions about his understanding of the world. ▶

Inside Animal Minds

In 1977, Irene Pepperberg, a recent graduate of Harvard University, did something very unusual. She was interested in learning if animals could think, and the best way to do this, she reasoned, was to talk to them. To test her theory, she bought an African gray parrot she named Alex and taught him to reproduce the sounds of the English language. "I thought if he learned to communicate, I could ask him questions about how he sees the world," she explains.

When Pepperberg began her research with Alex, very few scientists acknowledged that animals were capable of thought. The belief was that animals reacted to things in their environment but lacked the ability to think or feel. How, then, could a scientist demonstrate that animals might, in fact, possess intelligence? "That's why I started my studies with Alex," Pepperberg says.

Certain skills are considered key signs of higher mental abilities: a good memory, an understanding of symbols, self-awareness, understanding of others' motives, and creativity. Little by little, researchers have documented these abilities in other species. Sheep and elephants can recognize faces. Chimpanzees—who are genetically similar to humans—use a variety of primitive tools for eating, drinking, and hunting; they also laugh when pleased and spit[1] to show disgust with something. Octopuses in captivity[2] are known to amuse themselves by shooting water at laboratory staff. They may even exhibit basic emotions by changing color.

Alex the parrot was a surprisingly good talker. He learned how to use his voice to imitate almost 100 English words, including those for foods, colors, shapes, and numbers. Although imitation was once considered a simple skill, in recent years cognitive scientists have revealed that it's extremely difficult. It requires the imitator to form a mental image of the other person's body and actions and then adjust his own body parts into the same position. It is a behavior that shows an awareness of one's self.

Because Alex had mastered many English words, Pepperberg could ask him questions about a bird's basic understanding of the world. Alex could count, as well as describe, shapes, colors, and sizes for Pepperberg; he even had a basic understanding of the abstract concept of zero.

Betsy, a border collie, has a vocabulary of over 340 words and knows at least 15 people by name. ▶

Many of Alex's cognitive skills, such as his ability to understand the concepts of same and different, are generally attributed only to higher mammals, particularly primates (such as humans and apes). But parrots, like great apes (and humans), live a long time in complex societies. And like primates, these birds must monitor the changing relationships within the group. This may explain Alex's ability to learn a human language. "When we take [parrots] into captivity, what they start to do is treat us as their flock,"[3] explains Pepperberg. Parrots learn to pronounce and use our words so they can become a part of our group.

Researchers in Germany and Austria have also been studying language ability in dogs. One named Betsy has shown that she is able to learn and remember words as quickly as a two-year-old child. She has an extraordinary vocabulary of over 340 words (and counting), knows at least 15 people by name, and can link photographs with the real objects they represent. Like Alex, she's pretty smart.

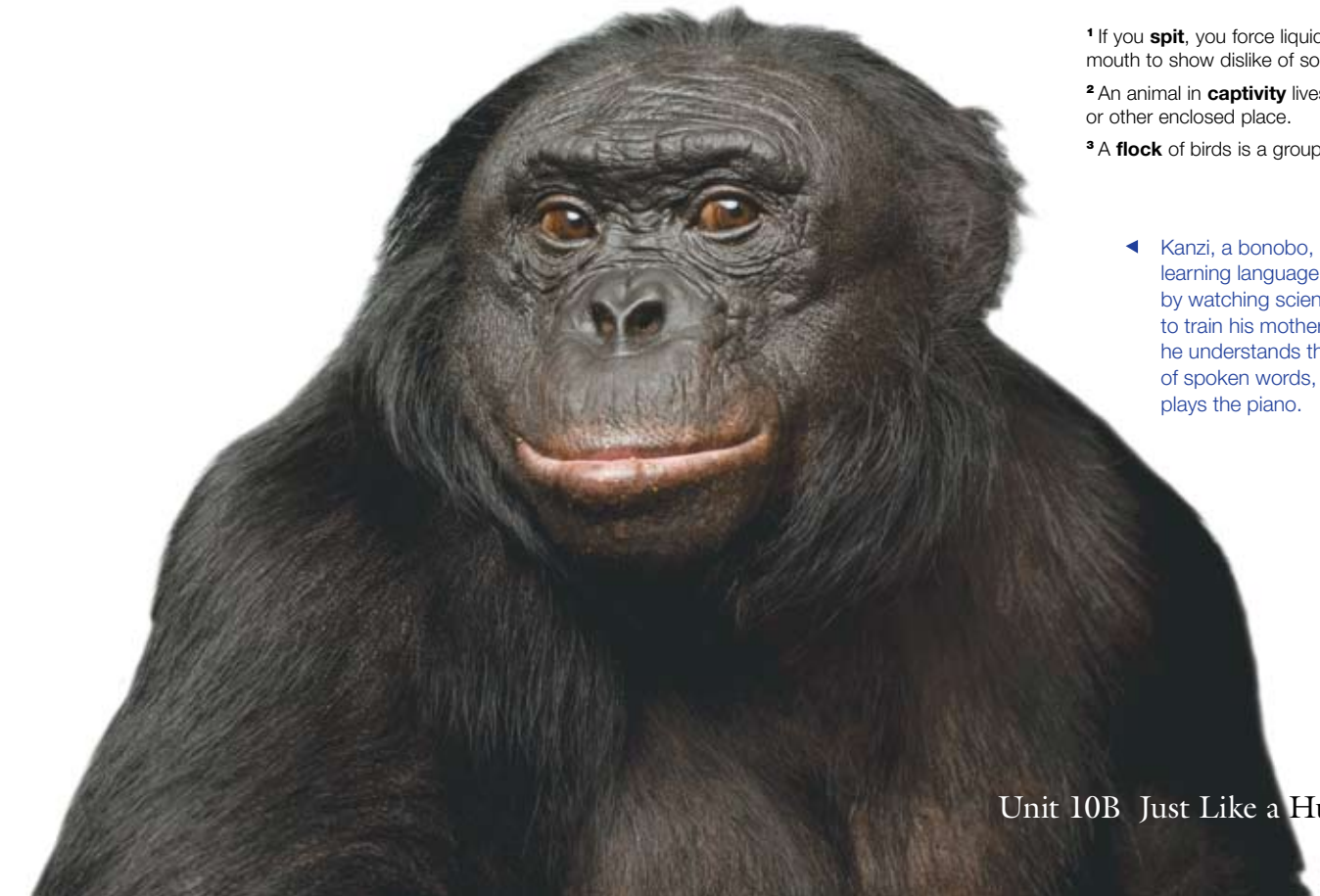
This is the larger lesson of animal cognition research: it humbles us. We are not alone in our ability to invent, communicate, demonstrate emotions, or think about ourselves. Still, humans remain the creative species. No other animal has built cities, written music, or made a computer. In fact, a number of critics dismiss animals' ability to use tools or understand human language. They believe animals are just simulating human behavior.

Yet many researchers say that creativity and language in animals, like other forms of intelligence, have evolved. "People were surprised to discover that chimpanzees make tools," says Alex Kacelnik, an animal researcher at Oxford University. "But people also thought, 'Well, they share our ancestry—of course they're smart.' Now we're finding these kinds of behaviors in some species of birds. But we don't have a recently shared ancestry with birds. It means," Kacelnik continues, "that evolution can invent similar forms of advanced intelligence more than once—that it's not something reserved only for primates or mammals."

[1] If you **spit**, you force liquid out of your mouth to show dislike of something.

[2] An animal in **captivity** lives in a zoo, a cage, or other enclosed place.

[3] A **flock** of birds is a group of birds.



◀ Kanzi, a bonobo, began learning language on his own by watching scientists trying to train his mother. At 27, he understands thousands of spoken words, and even plays the piano.