

anthropomorphize the dogs' behavior and believe it to be a sign of empathic skills, the authors of the study concluded that there is a simpler explanation. They argued that the human cry was similar to distress vocalizations of mammals, including dogs, so the cries evoked distress as opposed to empathy, which would have required the dog to recognize the humans' inner state.

Supporting this conclusion, a 2014 study led by psychologists Ted Ruffman and Min Hooi Yong of the University of Otago in New Zealand showed that listening to a human baby cry evokes stress in dogs, as revealed by an increase in the levels of cortisol in their blood. Needless to say, when your dog nuzzles you, his behavior is comforting whatever the impetus, but keep in mind that if you are tempted to elicit some affection by showing your sadness, your dog may not be feeling bad for you; he may just be feeling bad because he is stressed out.

### Do As I do!

Much of human culture is based on social learning. Language, the rules of society and the use of objects are all transmitted from the old to the young and from peer to peer. Dogs are very keen to learn by observation, too. The ability to learn socially is widespread among animals, but learning from representatives of a different species is much rarer. Because dogs regard humans as their social companions, their eagerness to learn by observing our activities should not be surprising; shepherds have long known as much. Yet science began probing the depth of this facility only a few years ago.

One of the most common tests of observational abilities involves a simple detour task, in which a dog must go around a fence of about three meters in length to reach a visible target (such as some food or a toy). In a 2001 study, animal behaviorist Péter Pongrácz and his team at Eötvös Loránd showed that family dogs need six or seven attempts to master this task through trial and error—but they can learn to make the detour after watching an expert dog complete the task only once. And the dogs learned equally well by watching a human expert.

The age-old imitation game that parents like to play with their babies is also helping researchers understand how dogs learn by ob-

# Decoding the Cat



**Felines may be hard to study, but we have learned a few things about them**

By Julia Calderone

Cats have a curious allure. Even the most pampered house cats seem to flaunt their independence, as if to say that they do not really need us to get by. Despite this hauteur—or perhaps because of it—many of us cannot resist bringing these regal creatures into our homes, litter boxes and all. In fact, cats outnumber canines as human companions, although we know surprisingly little about their cognition.

Our partnership with cats is long-standing. Feline DNA suggests that the domestic cat may have split from its wild counterpart in western Asia nearly 10,000 years ago. In 2014 a study by Michael J. Montague of Washington University in St. Louis and his colleagues identified a set of genes that may have been crucial in the transformation of the prehistoric cat into the cuddly pets we know today. These genes have been linked to key behavioral traits, such as the ability to learn and reduced fearfulness, which would have helped cats adapt to life in human company.

Yet many mysteries remain in deciphering feline behavior and intelligence, particularly in contrast to our growing knowledge of dogs. This gap arose in part because of the more urgent need to study dogs. Negative interactions between humans and hostile or misbehaving dogs are common societal problems.

A bigger reason for our poor grasp of the feline mind stems from the challenges of cat behavior. Whereas the ancestors of dogs roamed in packs and learned sophisticated strategies for interacting socially with other animals, the wildcat progenitors of today's house cats were more solitary animals. The patterns that govern their exchanges with one another and humans are therefore harder to parse. Ádám Miklósi and his colleagues have found that like dogs, cats are able to follow a pointed finger to food, but if the setup is rigged (say, if the bowl is just out of reach), the cat will give up; a dog will creatively strategize or look to humans for help. "If there's a problem," says anthrozoologist John Bradshaw of the University of Bristol in England, a specialist in human-animal interaction, "cats try to solve it on their own. And if they fail, they just walk away."

Cats are also tough to manage in the laboratory. "The second you take a cat out of its own home, it becomes nervous," says Marieke Gartner, a psychologist at the University of Edinburgh. If the cat is in its own territory, Gartner continues, it will react more naturally. As a result, most studies of cats are based on observations in the home rather than controlled experiments in the lab.

Given these challenges, we still have much to learn about cats. We can easily decipher a score of signals from dogs, but, Bradshaw says, "with cats, it's more like five or six." Here are the signs we know. *Julia Calderone is a freelance science writer based in New York City.*



**PURR** The purr seems to serve multiple purposes: to share emotional states such as happiness or distress; to express urgency, typically when a cat wants to be fed; or to signal stress or injury.

**MEOW** Cats generally do not meow at one another, but they learn a repertoire of meows to communicate with humans. Typical meow meanings are specific to a given relationship: an owner knows what his or her cat's meow means but cannot necessarily understand that of another feline.

**EARS** Ears back signals aggression. Ears forward signals interest.



**TAIL** Tail straight up shows that the cat is fond of you but also acknowledges that you are slightly superior to it.

Tail straight up and puffed out means the cat is angry.

Tail tucked between legs means the cat is insecure, trying to get away or withdrawing from the world.

**RUBBING ITS HEAD AND FACE ON THINGS** A cat has glands on the corners of its lips, between its eye and ear, and under its chin; this behavior marks territory, and some scientists believe it could signal affection.

**LYING ON ITS BACK, BELLY EXPOSED**

The cat is relaxed and trusts you.

**KNEADING** Kittens make this motion to stimulate mother's milk. In adulthood, researchers suspect the behavior is affectionate and signals that the kneaded individual is in a superior, mothering role.

**LICKING** Cats of the same size and status groom one another frequently, which is thought to improve bonds and eliminate aggression within the colony. "It's a genuine demonstration of affection," Bradshaw says, "which in cat societies is very important."

