

Assume you are taking a biology course. Your instructor has assigned the following article from U. S. News and World Report. Preview the article using the procedure described in this section. When you have finished, answer the questions that follow.

## Animal Emotions

Sheer joy. Romantic love. The pain of mourning. Scientists say pets and wild creatures have feelings, too.

By Laura Tanglely

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Intro  
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Love

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Intro  
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Grief

Swimming off the coast of Argentina, a female right whale singles out just one of the suitors that are hotly pursuing her. After mating, the two cetaceans linger side by side, stroking one another with their flippers and finally rolling together in what looks like an embrace. The whales then depart, flippers touching, and swim slowly side by side, diving and surfacing in perfect unison until they disappear from sight.

In Tanzania, primatologists studying chimpanzee behavior record the death of Flo, a troop's 50-year-old matriarch. Throughout the following day, Flo's son, Flint, sits besides his mother's lifeless body, occasionally taking her hand and whimpering. Over the next few weeks, Flint grows increasingly listless, withdrawing from the troop—despite his siblings' efforts to bring him back—and refusing food. Three weeks after Flo's death, the formerly healthy young chimp is dead, too.

A grief-stricken chimpanzee? Leviathans in love? Most people, raised on Disney versions of sentient and passionate beasts, would say that these tales, both true, simply confirm their suspicions that animals can feel intense, humanlike emotions. For their part, the nation's 61 million pet owners need no convincing at all that Fido



Who's Happy? Some animals, like cats, keep their feelings to themselves. Many biologists maintain that all mammals feel joy.

New data helps

support theory that animals have complex feelings.

and Fluffy can feel angry, in a rose, elated—even jealous or embarrassed. Recent studies, in fields as distant as ethology and neurobiology, are supporting this popular belief. Other evidence is merely anecdotal, especially for pets—dogs that become depressed, or even die, after losing a beloved companion, for instance. But the anecdote—or case study in scientific parlance—has now achieved some respectability among researchers who study animal behavior. As University of Colorado biologist Marc Bekoff says, “The plural of anecdote is data.”

4 Still, the idea of animals feeling emotions remains controversial among many scientists. Researchers' skepticism is fueled in part by their professional aversion to anthropomorphism, the very nonscientific tendency to attribute human qualities to nonhumans. Many scientists also say that it is <sup>(2)</sup>impossible to prove animals have emotions using standard scientific methods—repeatable observations that can be manipulated in controlled experiments—leading them to conclude that such feelings must not exist. Today, however, amid mounting evidence to the contrary, “the tide is turning radically and rapidly,” says Bekoff, who is at the forefront of this movement.

5 Even the most strident skeptics of animal passion agree that many creatures experience fear which some scientists define as a primary emotion that contrasts with secondary emotions such as love and grief. Unlike these more complex feelings, fear <sup>ex.</sup> is instinctive, they say, and requires no conscious thought. Essential to escape predators and other dangers, fear—and its predictable flight, fight, or freeze response—seems to be hard-wired into many species. Young geese that have never before seen a predator, for example, will run for cover if a hawk-shaped silhouette passes overhead. <sup>ex.</sup> The shape of a non-predatory bird, on the other hand, elicits no such response.

6 But beyond such instinctual emotions and their predictable behavioral responses, the possibility of more complex animal feelings—those that entail mental processing—is difficult to demonstrate. “I can't even prove that another human being is feel-

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Who's Happy? Obviously this playful orangutan.

ing happy or sad," says Bekoff, "but I can deduce how they're feeling through body language and facial expression." As a scientist who has conducted field studies of coyotes, foxes, and other canines for the past three decades, Bekoff also believes he can accurately tell what these animals are feeling by observing their behavior. He adds that animal emotions may actually be more knowable than those of humans, because they don't "filter" their feelings the way we do.

List of ways to prove feelings

Yet because feelings are intangible, and so tough to study scientifically, "most researchers don't even want to talk about animal emotions," says Jaak Panksepp, a neuroscientist at Bowling Green State University in Ohio and author of *Affective Neuroscience*. Within his field, Panksepp is a rare exception, who believes that similarities between the brains of humans and other animals suggest that at least some creatures have true feelings. "Imagine where we'd be in physics if we hadn't inferred

Another expert opinion to support no need for exact data (Inference is good)



Maternal Mourning. Many species, from polar bears to chimps, have been observed grieving their losses. Like depressed humans, some stop eating and wither.

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what's inside the atom," says Panksepp. "Most of what goes on in nature is invisible, yet we don't deny that it exists."

8 The new case for animal emotions comes in part from the growing acceptability of field observations, particularly when they are taken in aggregate. The latest contribution to this body of knowledge is a new book, *The Smile of a Dolphin*, which presents personal reports from more than 50 researchers who have spent their careers studying animals—from cats, dogs, bears, and chimps to birds, iguanas, and fish. Edited by Bekoff, who says it will finally legitimize research on animal emotions, the volume already has garnered scientific attention, including a Smithsonian Institution symposium on the subject this week.

9 Beastly joy. One of the most obvious animal emotions is pleasure: Anyone who has ever held a purring cat or been greeted by a bounding, barking, tail-wagging dog knows that animals often appear to be happy. Beastly joy seems particularly apparent when the animals are playing with one another or sometimes, in the case of pets, with people.

10 ① Virtually all young mammals, as well as some birds, play, as do adults of many species such as our own. Young dolphins, for instance, routinely chase each other through the water like frolicsome puppies and have been observed riding the wakes of boats like surfers. Primatologist Jane Goodall, who has studied chimpanzees in Tanzania for four decades, says that chimps "chase, somersault, and pirouette around one another with the abandon of children." In Colorado, Bekoff once watched an elk race back and forth across a patch of snow—even though there was plenty of bare grass nearby—leaping and twisting its body in midair on each pass. Though recent research suggests that play may help youngsters develop skills needed in adulthood, Bekoff says there's no question that it's also fun. "Animals at play are symbols of the unfettered joy of life," he says.

11 ② Grief also seems to be common in the wild, particularly following the death of a mate, parent, offspring, or even close companion. Female sea lions witnessing their pups being eaten by killer whales are known to actually wail. When a goose, which mates for life, loses its partner, the bird's head and body droop dejectedly. Goodall, who saw the young chimp Flint starve after his mother died, maintains that the animal "died of grief."

12 Elephants may be nature's best-known mourners. Scientists studying these behemoths have reported countless cases of elephants trying to revive dead or dying family members, as well as standing quietly beside an animal's remains for many days, periodically reaching out and touching the body with their trunks. Kenyan biologist Joyce Poole, who has studied African elephants since 1976, says these animals' behavior toward their dead "leaves me with little doubt that they experience deep emotions and have some understanding about death."

13 But there's "hard" scientific evidence for animal feelings as well. Scientists who study the biology of emotions, a field still in its infancy, are discovering many similarities between the brains of humans and other animals. In animals studied so far, including humans, emotions seem to arise from ancient parts of the brain that are located below the cortex, regions that have been conserved across many species throughout evolution.

② The most important emotional site identified so far is the amygdala, an almond-shaped structure in the center of the brain. Working with rats, neuroscientists have discovered that stimulating a certain part of the amygdala induces a state of intense fear. Rats with damaged amygdalas, on the other hand, do not show normal behavioral responses to danger (such as freezing or running) or the physiological changes associated with fear—higher heart rate and blood pressure, for example. . . .

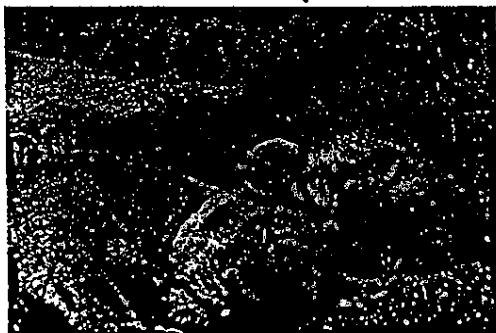
This expert does not believe animals have high enough level of consciousness to feel ~~des~~

15 No movie version? "A whale may behave as if it's in love, but you can't prove what it's feeling, if anything," says neuroscientist LeDoux, author of *The Emotional Brain*. He maintains that the question of feelings boils down to whether or not animals are conscious. And though animals "may have snapshots of self-awareness," he says, "the movie we call consciousness is not there." Richard Davidson, a neuroscientist at the University of Wisconsin-Madison, agrees that higher primates, including apes and chimps, are the only animals that have demonstrated self-consciousness so far. Still, he believes that there are other creatures that "may at least have antecedents of feelings." But

Or probably more, say Bekoff and his colleagues. Their most convincing argument, perhaps, comes from the theory of evolution, widely accepted by biologists of all stripes. Citing similarities in the brain anatomy and chemistry of humans and other animals, neuroscientist Sivy asks: "If you believe in evolution by natural selection, how can you believe that feelings suddenly appeared, out of the blue, with human beings?" Goodall says scientists who use animals to study the human brain, then deny that animals have feelings, are "illogical."

Profound Implications for human/animal future interactions.

17 In the end, what difference does it really make? According to many scientists, resolving the debate over animal emotions could turn out to be much more than an intellectual exercise. If animals do indeed experience a wide range of feelings, it has profound implications for how humans and animals will interact in the future. Bekoff, for one, hopes that greater understanding of what animals are feeling will spur more stringent rules on how animals should be treated, everywhere from zoos and circuses to farms and backyards.



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Petting and Fretting. Biochemistry may explain lions in love (left). Looks can deceive, though. This dolphin (right) may appear to be enjoying itself, but it's actually in distress.