

Science and Human Behavior

Know thyself! This injunction is at least as old as Apollo's oracle at Delphi, and it lies at the foundation of philosophy, history, literature, and most of the rest of the humanities. Why are we the way we are? Why do we behave the way we do? For millennia, philosophers and theologians have struggled to define humanity, often by opposing humanity to the rest of the natural world. Human behavior continues to perplex us, but today what was once primarily a philosophical and religious question is increasingly a scientific one. Evolutionary biologists, evolutionary psychologists, chemists, and physiologists are all adding pieces to the growing picture of how we behave and why. Scientists have discovered that fields as disparate as wildlife biology and chemistry can yield interesting answers to the ancient question "Who am I?"

This chapter provides a range of answers to that seminal question by attempting to answer other, more limited questions.

Why, for example, after September 11th, did we pull together? Why did thousands of people donate blood, money, labor, and materials? How do biologists and psychologists explain altruism? In the course of answering these questions, Natalie Angier ("Of Altruism, Heroism and Nature's Gifts in the Face of Terror") brings us closer to understanding the nature of human society and of the beings that make it up.

Why do I fall in love with the people I do? What makes a relationship last? What makes someone attractive to me and someone else not? Is there such a thing as a love potion? Should there be? In very different ways, both David Buss ("The Strategies of Human Mating") and Gunjan Sinha ("You Dirty Vole") answer this question

by investigating what evolutionary psychology and biochemistry can tell us about love and sex, those most perplexing and complex human experiences.

What can male violence against females in baboon and chimpanzee societies teach us about the conditions that foster such violence in human societies? Biopsychologist Barbara Smuts's ("Apes of Wrath") field studies in Africa help her to answer that question, but pose new ones about the direction of human society. Similarly, but drawing upon very different types of technology and science, Carl Zimmer ("Who Would You Save?") looks into how human beings make the ethical decisions they make. What is the biology, what the evolutionary cause, for our ethical choices?

So why do we behave as we do? It is because of chemical reactions in our brains. It is because of evolutionary advantage, and sexual-strategies theory. It is because of group survival and individual reproduction. It is because of physiological adaptation. This chapter will provide you with some questions and some answers, but more than anything, it will provide you with examples of the ways scientists are approaching—and answering—the question of human behavior.

This chapter will also feature a variety of forms by which scientists and writers present their information. From the scientific structure of David Buss's study to Natalie Angier's personal rumination on human altruism, we see the various ways that science is made popular and accessible to the culture and society of which it is a part. So as you read the essays in this chapter, consider not only how we know about ourselves, but how we communicate that knowledge to one another through writing.

Of Altruism, Heroism and Nature's Gifts in the Face of Terror

NATALIE ANGIER

Natalie Angier is one of the premier science writers in the United States today. She is the recipient of the American Association for the Advancement of Science Westinghouse Award for excellence in science journalism, and the Lewis Thomas Award for distinguished writing in the life sciences. She is also a founding staff member of Discover Magazine, and a winner of the Pulitzer Prize for her science

vile opposite threatened to choke us into submission last Tuesday. We rallied them in quantities so great we surprised even ourselves.

Nothing and nobody can fully explain the source of the emotional genius that has been everywhere on display. Politicians have cast it as evidence of the indomitable spirit of a rock-solid America; pastors have given credit to a more celestial source. And while biologists in no way claim to have discovered the key to human nobility, they do have their own spin on the subject. The altruistic impulse, they say, is a nondenominational gift, the birthright and defining characteristic of the human species.

As they see it, the roots of altruistic behavior far predate *Homo sapiens*, and that is why it seems to flow forth so readily once tapped. Recent studies that model group dynamics suggest that a spirit of cooperation will arise in nature under a wide variety of circumstances.

"There's a general trend in evolutionary biology toward recognizing that very often the best way to compete is to cooperate," said Dr. Barbara Smuts, a professor of anthropology at the University of Michigan, who has published papers on the evolution of altruism. "And that, to me, is a source of some solace and comfort."

Moreover, most biologists concur that the human capacity for language and memory allows altruistic behavior—the desire to give, and to sacrifice for the sake of others—to flourish in measure far beyond the cooperative spirit seen in other species.

With language, they say, people can learn of individuals they have never met and feel compassion for their suffering, and honor and even emulate their heroic deeds. They can also warn one another of any selfish cheaters or malign tricksters lurking in their midst.

"In a large crowd, we know who the good guys are, and we can talk about, and ostracize, the bad ones," said Dr. Craig Packer, a professor of ecology and evolution at the University of Minnesota. "People are very concerned about their reputation, and that, too, can inspire us to be good."

Oh, better than good.

"There's a grandness in the human species that is so striking, and so profoundly different from what we see in other animals," he added. "We are an amalgamation of families working together. This is what civilization is derived from."

At the same time, said biologists, the very conditions that encourage heroics and selflessness can be the source of profound barbarism as well. "Moral behavior is often a within-group phenomenon," said Dr. David Sloan Wilson, a professor of biology at the State University of New York at Binghamton. "Altruism is

practiced within your group, and often turned off toward members of other groups."

The desire to understand the nature of altruism has occupied evolutionary thinkers since Charles Darwin, who was fascinated by the apparent existence of altruism among social insects. In ant and bee colonies, sterile female workers labor ceaselessly for their queen, and will even die for her when the nest is threatened. How could such seeming selflessness evolve, when it is exactly those individuals that are behaving altruistically that fail to breed and thereby pass their selfless genes along?

By a similar token, human soldiers who go to war often are at the beginning of their reproductive potential, and many are killed before getting the chance to have children. Why don't the stay-at-homes simply outbreed the do-gooders and thus bury the altruistic impulse along with the casualties of combat?

The question of altruism was at least partly solved when the British evolutionary theorist William Hamilton formulated the idea of inclusive fitness: the notion that individuals can enhance their reproductive success not merely by having young of their own, but by caring for their genetic relatives as well. Among social bees and ants, it turns out, the sister workers are more closely related to one another than parents normally are to their offspring; thus it behooves the workers to care more about current and potential sisters than to fret over their sterile selves.

The concept of inclusive fitness explains many brave acts observed in nature. Dr. Richard Wrangham, a primatologist at Harvard, cites the example of the red colobus monkey. When they are being hunted by chimpanzees, the male monkeys are "amazingly brave," Dr. Wrangham said. "As the biggest and strongest members of their group, they undoubtedly could escape quicker than the others." Instead, the males jump to the front, confronting the chimpanzee hunters while the mothers and offspring jump to safety. Often, the much bigger chimpanzees pull the colobus soldiers off by their tails and slam them to their deaths.

Their courageousness can be explained by the fact that colobus monkeys live in multimale, multifemale groups in which the males are almost always related. So in protecting the young monkeys, the adult males are defending their kin.

Yet, as biologists are learning, there is more to cooperation and generosity than an investment in one's nepotistic patch of DNA. Lately, they have accrued evidence that something like group selection encourages the evolution of traits beneficial to a group, even when members of the group are not related.

In computer simulation studies, Dr. Smuts and her colleagues modeled two types of group-living agents that would behave like herbivores: one that would selfishly consume all the food in a given patch before moving on, and another that would consume resources modestly rather than greedily, thus allowing local plant food to regenerate.

Researchers had assumed that cooperators could collaborate with genetically unrelated cooperators only if they had the cognitive capacity to know goodness when they saw it.

But the data suggested otherwise. "These models showed that under a wide range of simulated environmental conditions you could get selection for prudent, cooperative behavior," Dr. Smuts said, even in the absence of cognition or kinship. "If you happened by chance to get good guys together, they remained together because they created a mutually beneficial environment."

This sort of win-win principle, she said, could explain all sorts of symbiotic arrangements, even among different species—like the tendency of baboons and impalas to associate together because they use each other's warning calls.

Add to this basic mechanistic selection for cooperation the human capacity to recognize and reward behaviors that strengthen the group—the tribe, the state, the church, the platoon—and selflessness thrives and multiplies. So, too, does the need for group identity. Classic so-called minimal group experiments have shown that when people are gathered together and assigned membership in arbitrary groups, called, say, the Greens and the Reds, before long the members begin expressing amity for their fellow Greens or Reds and animosity toward those of the wrong "color."

"Ancestral life frequently consisted of intergroup conflict," Dr. Wilson of SUNY said. "It's part of our mental heritage."

Yet he does not see conflict as inevitable. "It's been shown pretty well that where people place the boundary between us and them is extremely flexible and strategic," he said. "It's possible to widen the moral circle, and I'm optimistic enough to believe it can be done on a worldwide scale."

Ultimately, though, scientists acknowledge that the evolutionary framework for self-sacrificing acts is overlaid by individual choice. And it is there, when individual firefighters or office workers or airplane passengers choose the altruistic path, that science gives way to wonder.

Dr. James J. Moore, a professor of anthropology at the University of California at San Diego, said he had studied many species, including many different primates. "We're the nicest species I know,"

he said. "To see those guys risking their lives, climbing over rubble on the chance of finding one person alive, well, you wouldn't find ba-boons doing that." The horrors of last week notwithstanding, he said, "the overall picture to come out about human nature is wonderful."

"For every 50 people making bomb threats now to mosques," he said, "there are 500,000 people around the world behaving just the way we hoped they would, with empathy and expressions of grief. We are amazingly civilized."

True, death-defying acts of heroism may be the province of the few. For the rest of us, simple humanity will do.

Topics for Thought and Discussion

1. Angier's essay is written in very short paragraphs. Why? What does this text structure contribute to her essay and its purpose?
2. How does Angier use emotion to write a scientific essay? What role does emotion play for her, and how does it contribute to her purpose?
3. How do biologists account for the altruistic and heroic actions witnessed on September 11, 2001, and succeeding days?
4. The scientists interviewed by Angier for this article see September 11th, 2001, demonstrating hope for humanity in general. Explain the basis of this hope. Do you agree?

Suggestions for Writing

1. Evaluate your own response to the September 11, 2001 attacks or some other major natural or human event. How can the things you felt, the things you did, and the thoughts and actions of those around you be explained by the evolutionary forces described by Angier?
2. Write an essay in which you comment on altruism in your culture or society. Does it occur in nonemergency situations? Does our culture encourage and reward altruism?

The Strategies of Human Mating

DAVID BUSS

David M. Buss is an evolutionary psychologist at the University of Texas at Austin, and a pioneer in the study of the evolution of human mating. He is widely published; his works include, The Evolution of Desire: Strategies of Human Mating (1994), The Dangerous Passion: Why Jealousy Is Necessary in Love and Sex (2000),