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the tables and graphs they produced were equally effective at communicating, and memorializing, the awful history. Rather, this is a story about the interplay between fact and emotion, about the human need to create a factual record even in the direst of circumstances, when the creators of the record knew full well that they were about to become statistics themselves. Emotions do not necessarily scale with objective measures of the magnitude of an event; the memorial to the 168 victims of the Oklahoma City bombing of 1995 may be every bit as moving as the Vietnam memorial with its 58,261 names. As Wainer writes,

Worthy memorials draw on both fact and emotion. We should not underestimate the power of even simple numerical displays to help bridge the gap between a statistic and a tragedy.

In the final analysis, then, this book is not so much about uncertainty or graphical display as about the communication of facts, and the interplay of that information with interpretation, emotion and the many other subjective dimensions of the human experience. *Picturing the Uncertain World* will appeal to a wide audience, because its arguments are accessible and intuitive,

and the occasional references to statistical theory are handled very gently. Like two of Wainer's earlier books—*Visual Revelations: Graphical Tales of Fate and Deception from Napoleon Bonaparte to Ross Perot* (1997) and *Graphic Discovery: A Trout in the Milk and Other Visual Adventures* (2005)—this one makes for very fine reading and would be an excellent text for a general-education seminar.

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## NEUROSCIENCE

# Unique. Sort of.

Melvin Konner

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**HUMAN: The Science Behind What Makes Us Unique.** Michael S. Gazzaniga. xiv + 447 pp., HarperCollins/Ecco, 2008. \$27.50.

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The fine intellectual adventure that is Michael Gazzaniga's latest book, *Human: The Science Behind What Makes Us Unique*, opens with these sentences:

The great psychologist David Premack once lamented, "Why is it that the [equally great] biologist E. O. Wilson can spot the difference between two different kinds of ants at a hundred yards, but can't see the difference between an ant and a human?" The quip underlines strong differences of opinion on the issue of human uniqueness.

The fact that Gazzaniga added the phrase in brackets suggests less than complete concurrence with Premack.

But since this "quip" is meant to frame the book, it's interesting to recall that Wilson wrote in his most famous work, *Sociobiology* (1975), that "the development of human speech represents a quantum leap in evolution comparable to the assembly of the eukaryotic cell," which is tantamount to calling it one of the most important events in the history of life. Ironically, Premack is best known for his elegant work teaching a keyboard-based symbolic language to chimpanzees. In reality, though, neither Premack nor Wilson—nor, certainly, Gazzaniga—doubts for a moment that humans are unique,

and in more than just the sense in which any species is. Gazzaniga's goal in *Human* is to find out what makes us so.

It's a tall order, but a much more tractable one than the effort to explain, say, consciousness or free will. "What is the deal with humans?" (as Gazzaniga engagingly puts it) is an empirical question, and he is past master of the empirical materials, bringing to the task a 45-year career as a neuroscientist. A pioneer in the split-brain research that helped lay the foundations of our understanding of lateralization of function, Gazzaniga went on to make many discoveries on the frontier of brain imaging. He is editor of the comprehensive reference work *Cognitive Neurosciences*, now in its third edition, and is author of *The Ethical Brain* and many other books.

Here he is a helpful, amusing and modest guide. In the acknowledgments to *Human* he remembers his housemates in graduate school at Caltech, most of them physicists, as having been "all much smarter and wiser than I . . . They thought hard about hard problems and they cracked many of them."

Smarter, perhaps, in some ways; wiser, I doubt very much. Gazzaniga is about as wise as humans get, and wisdom is not about cracking hard problems. It's about judgment in the face of immense complexity. However hard a puzzle in phys-

ics may be, the solution is in retrospect elegant and clear. Human uniqueness is not a puzzle in that sense; rather, it is a domain of understanding, and however much understanding we gain, a great deal will remain messy and unclear—which is where wisdom comes in.

I can only give a sketch here of the compendium of unique human traits considered in this rich and rewarding book. The human brain has tripled in size over the 6 or 7 million years that have passed since humans diverged from chimpanzees. A certain amount of reorganizing went along with that increase in size, increased lateralization being a prime example. Many genes and noncoding RNAs are expressed only in human brains, and many of those have to do with wiring up the brain during development. Bipedal walking freed our hands and allowed us to develop our unusually opposable thumbs for making tools. Our brains uniquely evolved for language and for an exceptional ability to think about the mental states of others.

We are the only species that can gossip, an important means of social control, and only a human will expend energy punishing a cheater who has cheated someone else. We are the only creatures that show disgust (hence our peculiar concern with purity), blush in embarrassment or shed tears of emotion. We display levels of empathy attained by no other species. We mentally imagine and simulate the actions and experiences (pain, shame) of others to a remarkable extent. Our lives are pervaded by aesthetic choices and preferences unknown to other species. We create art, religion and narrative, and we are self-aware to the *n*th degree. Only we can

autocue, deliberately remembering and reminding ourselves of things.

These are just a few of the interesting points made, whose effect is to make you feel superior to all other species. You are, and you can enjoy sifting through the experimental evidence for that claim. Increasingly, these unique behavioral and psychological features are being tied to brain structure and function. Quite properly, Gazzaniga believes that these findings will lead in time to a coherent psychobiological theory, although his emphasis on modularity in the brain makes it possible to imagine a persistent lack of coherence.

One might have wished for more attention to animal field studies and cross-cultural comparisons, but even those are here to some degree. As most ordinary people throughout the world have long believed, humans are quite different from other animals. And Gazzaniga has not neglected the views of nonscientists. He asked a lot of acquaintances what they thought was unique about humans, and two of the responses he got are especially instructive.

A five-year-old said, "Animals don't have birthday parties for themselves, you have to give them one." And someone in an obstetrics clinic said, "I think at the core humans are no different from animals. We all have the bestial urges of expanding our hunting range, controlling resources, and spreading our DNA." The five-year-old offers one of an infinite number of things that only humans do, something that is particularly salient for him. You might say that many of the things discussed in this book are like that birthday party—unique, but too particular to make much sense of—although many are more interesting and may in time figure in a theory of how we are fundamentally different.

The dour observer at the obstetrics clinic offers a small number of characteristics that we share with other animals. The difficulty is that these may be more important than the infinite number of characteristics that we don't share. The question is not how we are fundamentally different, but how fundamental the differences are. That is what motivates many of us to consider what people have in common with chimpanzees, peacocks or, for that matter, ants. Countless unique human qualities were used by cultured Germans to murder millions. And only a human would advertise on the Internet to try to make a profit by bringing men seeking sex to an entrapped 13-year-old

girl. In the core of our uniquely human brain is a set of structures brought down from our evolutionary past, and it is far from clear that they are really controlled by the newer structures. Too often, our unique human qualities seem to end up in the service of baser motives that we share with many other species.

But enough of the dark side. One of the special human qualities is taking pleasure in contemplating big scientific and philosophical questions. If you want to find out what we know today about how human brains and minds transcend those of other species, and particularly if you take pleasure in contemplating our superiority, you can't do better than Michael Gazzaniga's *Human*. And although I myself may spend more time contemplating the dark side, I completely agree with Gazzaniga when he says,

No other species aspires to be more than it is. Perhaps we can be. Sure, we may be only slightly different, but then, some ice is only one degree colder than liquid water.

If we are to turn our unique features into such a phase shift, surely we must thoroughly understand them, and this book is an excellent place to start.

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## ECOLOGY

# Missing, and Sorely Missed

Peter A. Bednekoff

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**WHERE THE WILD THINGS WERE: Life, Death, and Ecological Wreckage in a Land of Vanishing Predators.** William Stolzenburg. viii + 291 pp. Bloomsbury USA, 2008. \$24.99 cloth, \$16 paper.

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We are enthralled by large predators, yet we have exterminated them throughout most of their historic ranges. We use them symbolically as mascots and they abound on crests, but for the most part we live apart from them: Few of us regularly cross paths with wolves or bears; any cougar attack is likely to make the national news.

In *Where the Wild Things Were*, science writer William Stolzenburg examines the dramatic role of large predators in maintaining biological diversity. The central idea of the book is that these animals produce a cascade of ecological effects, often by changing the behavior of their prey and of smaller predators. Thus ecosystems without predators may become profoundly impoverished. The book makes these points through a series of connected vignettes.

The action starts in 1963 with ecologist Robert T. Paine flinging ochre starfish (*Pisaster ochraceus*) off selected patches of rocky shore along the Olympic Peninsula. This experiment, still one of the most-cited studies in

community ecology, showed that in the absence of the predatory starfish, space-hogging mussels took over what had been a diverse community.

Then the scene changes: It's 1921 and we're on Spitsbergen (an island in the Barents Sea about halfway between Norway and the North Pole), where Oxford naturalist Charles Sutherland Elton is conducting an ecological survey. After three summers in Spitsbergen, Elton would write *Animal Ecology*, a book that introduced what has become one of the most important concepts in the field of community ecology—food webs. Elton defined *niche* as an animal's "relations to food and enemies." Such insights were influential, but it took biologists some time to realize that ecosystems deprived of predators are decidedly abnormal.

Back to Paine: In the late 1960s, he and one of his students performed an experiment in which they removed sea urchins from tide pools and found that in their absence kelp quickly established itself. In 1971 Paine passed this information along to James A. Estes, a graduate student in zoology at the University of