

and Parkinson's diseases. "Cigarette smokers are believed to have a lower risk of contracting either of these diseases, and nicotine is thought to afford the protection," Brennan writes. Numerous studies have shown that smoking wards off Parkinson's; the evidence on Alzheimer's is less clear.

Of course, smoking carries lethal risks: lung cancer, heart disease, stroke. At a scientific symposium earlier this year on nicotine's therapeutic potential, Edward D. Levin, a professor of psychiatry and behavioral sciences at Duke University, began with this advice: "Don't smoke!"

## *Animal Numeracy*

"What Do Animals Think about Numbers?" by Marc D. Hauser, in *American Scientist* (Mar.–Apr. 2000), P.O. Box 13975, Research Triangle Park, N.C. 27709–3975.

More than 1,000 rhesus monkeys live on the Puerto Rican island of Cayo Santiago. Hauser, a psychology professor at Harvard University and the author of *Wild Minds* (2000), gave some of the wild monkeys there an arithmetic test. He and his students conspicuously placed two bright purple eggplants behind a screen but when they removed the screen the monkeys might behold one, two, or three eggplants. Just as human infants had done in similar tests, the monkeys tended to look longer when one or three eggplants appeared instead of the expected two.

From those and other experiments, Hauser says, it appears that wild rhesus monkeys, like human infants, can distinguish among *one*, *two*, *three*, and *many* objects. Other research, moreover, has shown that with training, monkeys and other animals can develop more sophisticated numerical abilities. Pigeons and rats, for instance, have learned to peck or press a button 24 times, no more, no less, to obtain a food pellet. Recent experiments by Columbia University psychologists demonstrated that captive rhesus

monkeys can grasp the ordinal relations among the numbers one to nine and indicate the proper numerical order for various quantities of different images. "The rhesus monkeys' performance was excellent—but only after receiving hundreds of training trials," notes Hauser.

Though the situations that animals confront in the wild may call for limited numerical abilities—chimpanzees, for instance, insist on "strength in numbers" (at least three adult males) before they'll attack an intruding chimp from another pack—they apparently do not require the numerical precision and skills found in humans. This prompts Hauser to ask: "What kind of evolutionary or ecological pressures would have favored the numerical competence found in *Homo sapiens*?" His admittedly speculative answer: When trading appeared on the scene, precision became necessary to ensure a fair exchange. "Selection favored those individuals capable of enumeration and combinatorial computation with symbols." And thus, he says, was the groundwork laid for algebra, calculus, and set theory.

## *What's in a Meme?*

"The Meme Metaphor" by Mark Jeffreys, in *Perspectives in Biology and Medicine* (Winter 2000), Johns Hopkins Univ. Press, Journals Div., 2715 N. Charles St., Baltimore, Md. 21218–4363.

Darwinist Richard Dawkins's speculative concept of a *meme*—a replicating cultural entity analogous to a gene, that might explain how human culture evolves—has caught on in recent years. There's even a three-year-old academic journal devoted to the fledgling science of memetics. Unlike some prominent scientists, Jeffreys, an English professor

at the University of Alabama at Birmingham, does not dismiss memetics out of hand, but he says much work is needed to make the meme metaphor scientifically useful.

What is a meme? A lexicon on the *Journal of Memetics* website ([www.cpm.mmu.ac.uk/jom-emit](http://www.cpm.mmu.ac.uk/jom-emit)) gives this definition: "A contagious information pattern that replicates by para-

sitically infecting human minds and altering their behavior, causing them to propagate the pattern. . . . Individual slogans, catch-phrases, melodies, icons, inventions, and fashions are typical memes.”

Jeffreys, however, contends that memeticists are mixing metaphors—ones drawn from virology, such as hosts and parasites, with the basic metaphor drawn from genetics. That metaphor asserts “that memes parallel genes” and form an independent, cultural system of natural selection. Researchers should stick with it, he maintains. “If memetic replication is not based on genetic replication and is truly part of a new selection process,” he says, “it cannot be considered parasitic, nor can humans be called hosts. In certain respects, the spread of beliefs, fashions, technologies, and types of artifacts [does] resemble epidemics, but in those respects so does the spread of life on Earth in the first place, along with the subsequent waves and collapses of spreading speciation and mass extinctions.”

Yet even with the viral metaphors discarded, Jeffreys says, memetics still is not genetics,

nor “even a fully fledged theory of selection because it has proposed no plausible mechanism for sufficiently high-fidelity self-replication” of the memes. This is not a fatal flaw, in his view. It merely puts memetics in roughly the same situation as the “largely speculative” study of the origin of life, though without the plausibility that enterprise derives from “the success of the Darwinian explanations of speciation and the fossil record.”

That offers a clue as to how memeticists should proceed, Jeffreys believes. “Culture most probably evolves,” he says, “but relevant empirical evidence is desperately needed” to determine whether it evolves in memetic fashion, by a separate Darwinian system. Memeticists, he urges, should develop “a plausible model of replication,” and test it against existing “cultural equivalents of species, such as religions and ideologies.” If they can show, for instance, how the incest taboo or adoption, which run counter to people’s “genetic interests,” are culturally transmitted, then memetics “will no longer be ‘cocktail party science.’”

## ARTS & LETTERS

### *The Other Daumier*

“‘Strange Seriousness’: Discovering Daumier” by Roger Kimball, in *The New Criterion* (Apr. 2000), 850 Seventh Ave., New York, N.Y. 10019.

Honoré Daumier’s amusing and clever caricatures of lawyers, doctors, politicians, and other denizens of 19th-century Paris remain well known today. But his haunting paintings of Don Quixote and other subjects have been far less celebrated—at least until the recent hit exhibition of his works at the Phillips Collection, in Washington. Much the same discrepancy in response confronted Daumier (1808–79) during his life, observes Kimball, managing editor of the *New Criterion*. “Time and



*The exact subject of Daumier’s painting The Uprising (1852–58) is unknown, but it may have been the Revolution of 1848 in France.*