

ings to subsidize mass transit.) And, the author notes, while the top earners accumulated ever-larger fortunes, median family income dropped two percentage points between 1990 and 1995. The rich have spent more on luxury items, but, contrary to the assumptions of laissez-faire economics, society as a whole has not benefited.

After lamenting the growing gap between rich and poor, an issue often raised by liberals, the author borrows the rhetoric of Darwinian analysis from conservatives to explain the acquisitive compulsion. Male deer through the generations have sprouted ever-larger antlers because, it appears, females find them alluring. Massive antlers thus help propagate the species, but they also make it difficult to navigate through thick forests. Conspicuous consumption, Frank contends, is the human equivalent of antlers. (He fails to note what may be a closer equivalent: cos-

metic surgery, which he derides elsewhere as wasteful.) To pay for larger homes and spiffier cars, Americans immerse themselves in debt, work through evenings and weekends, and, like the unwieldy bucks, find life increasingly difficult to navigate.

Frank proposes heavily taxing conspicuous consumption in order to encourage "inconspicuous consumption," which would result in cleaner air, happier families, and longer vacations. But such measures, including a now-repealed tax on luxury boats, have failed in the past. More to the point, materialism, economic inequality, and environmental degradation have roots running deep in American history. The Vanderbilts lived opulently long before Bill Gates. *Luxury Fever* sets forth our spending patterns in rich detail, but fails to account for the traits of American character that underlie them.

—Richard Houston

Science & Technology

VIRTUAL REALISM.

By Michael Heim. Oxford Univ. Press. 264 pp. \$26

Technological disciplines have collective personalities. While the field of artificial intelligence (AI) is that former prodigy who has been bumped around but is still game, virtual reality (VR) is AI's sexier, younger, right-brain cousin, wilder, more sensuous, with a larger circle of admirers ranging from Pentagon warriors to neo-bohemians.

Heim is a philosopher determined to sort out what new technologies mean for enduring humanistic issues, beginning with *Electric Language* (1987), on the implications of word processing, and continuing with *The Metaphysics of Virtual Reality* (1993). He presents *Virtual Realism* as an alternative

to debunking books by authors as varied as Clifford Stoll, Sven Birkerts, and Bill McKibben. Yet he also distances himself from those enthusiasts who foresee a posthuman cyborg destiny for our species.

From Heim's account, at least two main directions for virtual reality emerge. Operational telepresence is today's successor to the flight simulation technology familiar in military and civil aviation, in which a human interacts with electronic (and sometimes physical) representations of physical objects. Artificial telepresence is more abstract, a synthetic social space rather than the representation of an existing physical one. Fabricated personalities called avatars, directed by programs or by human participants, can interact in a world with properties unknown in



our universe. But artificial telepresence can also be used to design manufacturing systems that run in the physical world.

Heim gives some attention to helmet-mounted displays, the gloves, and other simulation apparatus most commonly identified with VR. But he notes the practical difficulties that have frustrated early recreational versions of these combat-born techniques, including nausea and disorientation in a significant number of users. He notes an alternative form of VR, the CAVE Automatic Visual Environment, that does not isolate the senses like (to use his metaphor) a falcon's hood. It is a 10-foot cube of display screens in which participants can interact with virtual objects. Originally designed for scientific visualization, it is now used by Detroit automotive designers as well as media artists.

Heim points to a VR that is not a replacement for nature or the social world, but merely an enhancement. He takes issue both with "naive realists" who fear VR as an opiate amid the devastation of the living planet and with the "network idealists" and "data idealists" who are indifferent as to the source of a sensory input.

Virtual reality emerges from this book as a genuinely gifted youngster with distinguished ancestors in the arts and sciences. Heim could have added that VR also has a strong religious heritage. From the 13th-century friar Roger Bacon to the architects of the Mormon Church, Western religious leaders have long sought rich sensory representations of invisible realities. Heim himself uses a theological metaphor when he writes that VR "does not imitate life but transubstantiates it."

AI has taken far longer than expected to live up to its promise. Is VR also destined to be an underachiever? Heim's rich sampling of its techniques convinces me that VR is indeed for real. But, as with so many other innovations, its most important achievements may be far different from what we project. *Virtual Realism* is a refreshingly thoughtful overview of the possibilities, and a welcome invitation to humanist critics to understand and guide them.

—Edward Tenner

**CHILDREN OF PROMETHEUS:
*The Accelerating Pace of
Human Evolution.***

By Christopher Wills. Perseus Books.
288 pp. \$25

With the recurrent political and religious assaults on "Darwinism," it remains worth arguing that humankind has evolved and is still evolving. *Children of Prometheus* advances the argument more effectively than most books, whether scholarly or popular. Wills, a professor of biology at the University of California, San Diego, makes a broad selection of recent findings genuinely accessible to general readers, including students. Technical parts of the argument—such as the presentation of balanced genetic polymorphism and the forces of natural selection sustaining it—read smoothly, betraying none of the labor that must have gone into the writing.

Moreover, Wills goes a crucial step further. He emphasizes and supports the claim that human evolution—real biological evolution, not just cultural change—is accelerating. Our species has been evolving quickly by ordinary standards (for example, those for other primates) and the pace is speeding up. Although only small differences in overall DNA composition separate us from our nearest relatives, the chimpanzees, those gene differences have produced huge structural and other phenotypic changes, enabling humans to outdistance the chimps since the two lineages separated. Much of the book is devoted to explaining the reasons and mechanisms for the acceleration.

Wills argues that the distinction between human biological and cultural evolution is a false one. The two are locked in a positive-feedback loop, whereby evolution of cognitive capacity (which at first had to be genetic) results in a greater ability to alter the environment. Those alterations produce powerful selective forces in favor of enlarged and novel cognitive capacities for coping with environmental stress. The enlarged capacities lead to further (sometimes destructive) changes in the environment. And so on. Meanwhile, migrations enlarge the gene pool of merged human (or hominid) populations. Thus, the supply of genetic variation—the raw material of evolution—increases as cultural change fuels environ-