ought to be is a product of reason. Often mistakenly attributed to David Hume, this dualistic view was formulated by Immanuel Kant, who used it as an argument against the sort of ethical naturalism developed by Hume. "If we agree with Kant that the 'moral ought' belongs to an utterly autonomous realm of human experience that transcends the natural world," Arnhart notes, "then we would have to say that any move from human nature to human morality is mistaken. But if we agree with Hume that moral obligation is grounded in natural human sentiments or desires, then we would have to say that human morality must be rooted in human nature."

Thus, James Q. Wilson—taking cues from Aristotle and Hume as well as Charles Darwin and modern genetic science—argues that natural selection may have promoted a psychological propensity to "attachment" or "affiliation," which enhanced reproductive fitness by inclining parents to care for their young. Out of this natural phenomenon, in Wilson's view, grew more generalized sentiments of "sympathy" and "benevolence," which form the basis of abstract ideas about ethics. Human values, Robert McShea maintains, arise from reflections on *natural* human feelings. If that is so, Arnhart says, then there is no absolute gap between *is* and *ought*.

"Kant's primary argument for a radical separation of the natural *is* and the moral *ought*," he observes, was that all moral judgment required "freedom of the will." Moral freedom was freedom *from* nature. But for Aristotle, Hume, and Darwin, Arnhart points out, "the uniqueness of human beings as moral agents requires not a free will that transcends nature but a natural capacity to deliberate about one's desires." If choice is what matters, he says, then there is no absolute gap between nature and freedom.

In practical terms, accepting the biological origins of moral thought opens many doors. Instead of an absolute gap between nature and nurture, there is a complex interplay between them. Many psychologists assume that the effects of parental care on children demonstrate that nurture is more important in human development than nature. But Arnhart notes that recent research in behavioral genetics (largely based on adoption and twin studies) "indicates how the natural temperament of the child shapes the social environment. . . . Successful parenting is not the imposition of external norms on the child but the cultivation of the child's innate potential."

The false dichotomies between facts and values, freedom and nature, and nurture and nature, Arnhart says, have kept the social sciences separate from the natural sciences. If the new Darwinian naturalists carry the day, he concludes, then social science "could become once again—as it was for Aristotle, Hume, and Darwin—the science of human nature."

SCIENCE, TECHNOLOGY & ENVIRONMENT

The Science of Sex Differences

"Sex Differences in Mental Test Scores, Variability, and Numbers of High-Scoring Individuals" by Larry V. Hedges and Amy Nowell, in *Science* (July 7, 1995), 1333 H St. N.W., Washington, D.C. 20005.

More men than women do extremely well on intelligence tests. Does that mean the average man is smarter than the average woman? Not at all, say Hedges, a professor of education at the University of Chicago, and Nowell, a graduate student there. But the disparity may pose problems for efforts to equalize the number of male and female scientists.

Six national surveys of adolescents and young adults conducted between 1960 and 1992 generally showed little difference in the

average scores of men and women in tests of mental abilities, in most areas of intellectual activity. The big exception was that the average man did far better than the average woman on vocational aptitude tests for mechanical reasoning, electronics information, and auto and shop information. Otherwise, the differences were generally slight: women did a little better than men on tests of reading comprehension, perceptual speed, and associative memory, while men did somewhat better on tests of mathematics and social studies. One of the surveys indicated that the male edge in science and mathematics has narrowed over the years.

What may be more important than average scores, however, is the fact, illustrated by the various national surveys, that the test scores of males are much more *variable* than those of females. In mathematics, science, and social studies, as many as 3.4 times as many males as females scored in the top 10 percent. Females were somewhat overrepresented in the bottom 10 percent.

The result: even though average scores are not so far apart, only one-half to one-seventh as many women excel in science and mathematics as men. That makes the goal of numerical equity between the sexes in those fields seem daunting indeed.

Family Matters

"Kin Recognition" by David W. Pfennig and Paul W. Sherman, in *Scientific American* (June 1995), 415 Madison Ave., New York, N.Y. 10017–1111.

As shown by the use of surnames (not to mention family reunions), humans attach a lot of importance to knowing who their relatives are. So, it seems, do wasps, wildflowers, and many other members of the plant and animal kingdoms. Pfennig, a biologist at the University of Illinois, and Sherman, a professor of animal behavior at Cornell University, explain how—and perhaps why—the process works.

Some organisms, such as primates and frogs, recognize their kin by their distinctive physical characteristics, sensing these directly by sight, sound, or smell. Other organisms pick up indirect clues from place or time as to who their relatives are. Bank swallows, which nest in colonies on sandbanks, use both methods to identify their young. For about three weeks after hatching, parent bank swallows will feed any nestlings they find in their burrow. After the chicks learn to fly, however, broods mix extensively, and the parents are forced to turn to direct means of identification, picking out their own young by the distinct vocal signatures that chicks develop by the time they are 20 days old.

Such recognition "labels" can reflect genetic traits, as in the case of certain sea squirts. These brainless marine animals, the authors write, "begin life as planktonic larvae that eventually settle on a rock and multiply asexually to form an interconnected colony of structurally and genetically identical animals." Sometimes, two genetically similar colonies merge. If a colony tries to join another unrelated one, however, the latter emits poisonous substances to repel the invader.

Other organisms use ID "labels" acquired from their environment. Certain types of the common garden insects known as paper wasps, for example, build open comb nests composed of wafer-thin plant fibers. Each wasp early on "assimilates from its nest an odor specific to the insects that live there," Pfennig and Sherman say, and this smell, derived from the plant fibers, is locked into the insect's skin before it hardens. Colonies of paper wasps typically consist of a queen and her daughter workers. When wasp visitors show up, their smell labels make it possible to distinguish between homeless relatives whose nests have been destroyed and alien wasps bent upon stealing eggs to feed the larvae in their own colonies. The kin are welcomed, the others repulsed.

Why is favoritism shown to relatives other than offspring? There may be more than one evolutionary reason, but Pfennig and Sherman say that according to the now-standard "inclusive fitness" theory developed by William D. Hamilton of the University of Oxford in 1964, natural selection favors organ-