For Whom the Bell Curve Really Tolls

A tendentious tome abuses science to promote far-right policies

Rarely do 800-page books that are crammed with graphs reach best-seller lists. *The Bell Curve,* an inflammatory treatise about class, intelligence and race by the late Richard J. Herrnstein, a psychology professor at Harvard University who died last September, and political scientist Charles Murray of the American Enterprise Institute, is an exception. The book's deeply pessimistic analysis of U.S. social woes, together with its conservative policy prescriptions, has hit a nerve.

JEFFRY MYERS *FPG International*

***EDUCATION** can benefit all, a truth being forgotten in the clamor over* **The Bell Curve.**

Publishing *The Bell Curve* may have been a calculated political move on the part of its authors. As the country lurches to the right, many people will be seduced by the text's academic trappings and scientific tone into believing its arguments and political inferences well supported. Those readers should think again.

The Bell Curve depicts a frightening future in which, absent strong corrective measures, a "cognitive elite" will live in guarded enclaves distant from the dull masses. Opportunities for the underclass will become limited as tolerance evaporates. Strict policing will be widely accepted, and racial hostility will most likely spread. The least intelligent denizens of this dystopia will be consigned to a "high-tech and more lavish version of the Indian reservation."

This apocalyptic vision is presented as the consequence of unpalatable, undeniable "facts" about inheritance and intelligence. But the thesis rests on curiously twisted logic. Its authors have been highly selective in the evidence they present and in their interpretation of ambiguous statistics. The work is "a string of half-truths," states Christopher Jencks, a sociologist at Northwestern University.

The arguments stem from the same tradition of biological determinism that led, not so long ago, to compulsory sterilizations in the U.S. and genocide elsewhere. The notion is that individuals' characteristics are both essentially fixed by inheritance and immune to alteration by the environment. Efforts to help those who are unfortunate by reason of their genes are unlikely to be rewarded. Solutions, therefore, should include those Murray has long advocated: abolish welfare, reduce affirmative action and simplify criminal law.

Herrnstein and Murray produce data suggesting that intelligence—as assessed by a high IQ score—is increasingly important to economic success. They also argue that people who have low scores—including disproportionate numbers of blacks—are more likely than others are to fall prey to social ills. The two accept evidence from studies of twins reared apart that there is a large heritable component to IQ scores: they estimate it to be 60 percent. The writers declare themselves agnostic on the question of whether racial differences in IQ scores are genetic, although they are clearly inclined to favor that possibility.

Herrnstein and Murray concede that just because a trait has a heritable origin does not mean it is unchangeable. Nearsightedness is one example of an inherited, modifiable condition. But they decide, on the basis of a questionable look at the data, that "an inexpensive, reliable method of raising IQ is not available." This conclusion is used to justify an attack on programs aimed at helping society's most vulnerable; the authors prefer to let the genetically disadvantaged find their own level. Evidence that does not accord with Herrnstein and Murray's way of thinking—such as the observation that IQ scores worldwide are slowly increasing—is acknowledged, then ignored.

Leaving aside the substantial and unresolved issue of whether a single number can adequately summarize mental performance, *The Bell Curve* plays fast and loose with statistics in several ways. According to Arthur Goldberger, an econometrician at the University of Wisconsin who has studied genetics and IQ, the book exaggerates the ability of IQ to predict job performance. Herrnstein and Murray assert that scores have an impressive "validity" of about 0.4 in

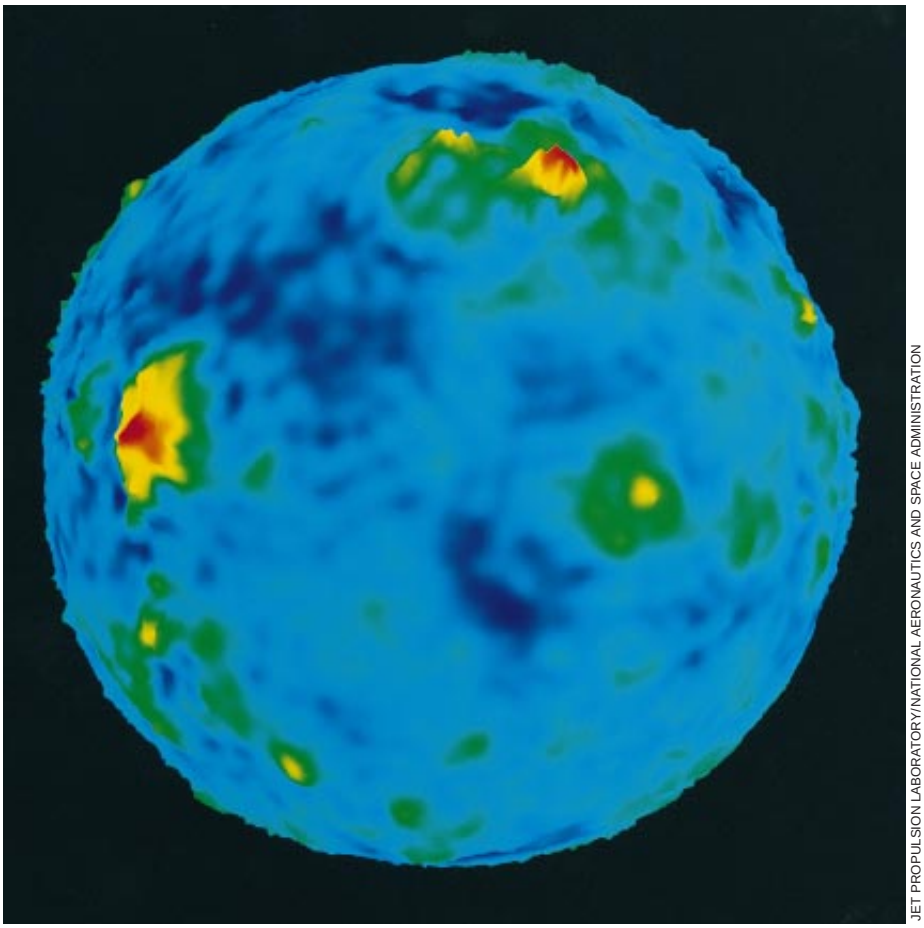
such predictions. They report that the Armed Forces Qualification Test, an IQ surrogate, has a validity of 0.62 at anticipating the success of training for mechanical jobs. Yet many of the measures used to assess validity include supervisors' ratings, which are subject to bias, Goldberger notes. Furthermore, the validities that the duo see as so revealing are, in fact, hypothetical quantities that no employer would expect to find in prospective employees. "It's really bad stuff," Goldberger says.

Other correlations that the writers establish between social ills and low IQ scores are equally suspect. Herrnstein and Murray put great weight on comparisons between the ability of IQ scores and parental socioeconomic status to predict what will happen to young people. Yet the measures of socioeconomic status they use cannot ensure that homes are equally stimulating. The point is crucial because numerous studies have demonstrated that early childhood surroundings have a large role in molding IQ scores—while very few studies have indicated a significant role for heredity. Consequently, conclusions about the dominance of IQ cannot be taken at face value. Leon Kamin, a psychologist at Northeastern University and well-known critic of research on intelligence, maintains that interactions between genes and environment make attempts to weigh nature against nurture "meaningless."

Herrnstein and Murray's hereditarian bias is also obvious in their account of a study of 100 children from varying ethnic backgrounds who were adopted into white families. The study got under way in the 1970s. At age seven, the black and interracial children scored an average of 106 on IQ tests—considerably better than the national average of black children and close to levels scored by white children. A decade later researchers Sandra Scarr of the University of Virginia and Richard A. Weinberg of the University of Minnesota found that the IQs of the black and interracial children had declined to 89 and 99, respectively, whereas those of white adoptees had fallen from 112 to 106.

Scarr and Weinberg concluded that racially based discrimination at school probably explained the drop in the black youngsters' scores. Jencks agrees: "The results are perfectly consistent with the difference being due to something in the early home environment and, for older kids, their experience in school." But Herrnstein and Murray interpret the findings differently: "Whatever the environmental impact may

Deathbed Revelations



JET PROPULSION LABORATORY/NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

The *Magellan* spacecraft, which produced spectacular radar images of the surface of Venus, gave its life to science when it plunged into that planet's murky atmosphere on October 12. Project scientists had maneuvered *Magellan* into a low, and ultimately sacrificial, orbit so that it could map Venus's gravitational field. Tiny wiggles in the orbit betrayed local variations in the mass of the planet, clues to its internal structure. The resulting gravity map is shown here superimposed on an exaggerated-relief image of Venus's topography. Gravitational highs are rendered in red; gravitational lows are displayed in blue.

As *Magellan* dipped closer to its infernal doom, it performed unprecedented acrobatic feats. The drag created as the craft sped through the thin upper atmosphere pulled it ever downward, producing the first real-world test of aerobraking. The new fuel-saving technique will be used by the *Mars Global Surveyor* to help guide it into orbit around the red planet in 1997.

Magellan also turned its solar panels to mimic a windmill. Technicians measured how much thrust was required to keep the probe from spinning—information that yielded surprising data about Venus's atmosphere. According to Robert H. Tolson of George Washington University, the atmospheric drag about 150 kilometers above the surface was only about half as great as anticipated but then increased unexpectedly at lower altitudes. "This is an exciting new method for measuring atmospheric properties," he says, one that may soon be applied to earth-orbiting satellites. *Magellan* may live no more, but new insights and questions have arisen from its ashes. —*Corey S. Powell*

have been, it cannot have been large."

The Bell Curve's most egregious failing, however, may be its bleak assessment of educational efforts to improve the intellectual performance of children from deprived backgrounds. Herrnstein and Murray cast a jaundiced eye over Head Start and other efforts for at-risk youngsters—projects that have been claimed to produce long-lasting gains in IQ, a possibility that would not square well with biological determinism. Herrnstein and Murray downplay such results, noting that such interventions are too expensive to be widely used. The only one they are enthusiastic about is adoption, which, paradoxically, they accept as having a positive effect on IQ. "Their treatment of intervention wouldn't be accepted by an academic journal—it's that bad," exclaims Richard Nisbett, a psychology professor at the University of Michigan. "I'm distressed by the extent to which people assume [Murray] is playing by the rules."

Jencks is also unhappy with the book's conclusions about education. "Herrnstein and Murray are saying Head Start didn't have a profound effect. But that doesn't tell us that we couldn't do a lot better if we had a different society," he says. "In Japan, for example, children learn more math than they do in the U.S. because everybody there agrees math is important."

Scarr, who accepts a substantial role for heredity in individual IQ differences, insists that efforts to boost intellectual functioning in disadvantaged youth can deliver results. "There's no question that rescuing children from desperately awful circumstances will improve their performance," she notes.

Scarr also points out that ameliorating a child's environment may reduce social problems, regardless of its effect on IQ. "The low-IQ group deserves a lot more support than it is getting," she argues. "Other societies manage not to have the same levels of social ills as we do." Edward F. Zigler, a prominent educational psychologist at Yale University, asserts that "in terms of everyday social competence, we have overwhelming evidence that high-quality early education is beneficial."

Therein lies the fatal flaw in Herrnstein and Murray's harsh reasoning. Even though boosting IQ scores may be difficult and expensive, providing education can help individuals in other ways. That fact, not IQ scores, is what policy should be concerned with. *The Bell Curve*'s fixation on IQ as the best statistical predictor of a life's fortunes is a myopic one. Science does not deny the benefits of a nurturing environment and a helping hand. —*Tim Beardsley*

The Great Attractors

Chemical guides direct young neurons to their final destinations

More than a century ago the renowned Spanish neurobiologist Santiago Ramón y Cajal discovered the growth cone, "that fantastic ending of the growing axon." His find partially explained one of the most fundamental and dynamic events in embryonic development. These "living battering rams," as he observed, sprout from nerve cells and forge ahead toward select tissues. Hence, he suggested that these structures enable young neurons to wire the synaptic links that form an adult nervous system. Until recently, though, no one had figured out how the growth cones know where to go.

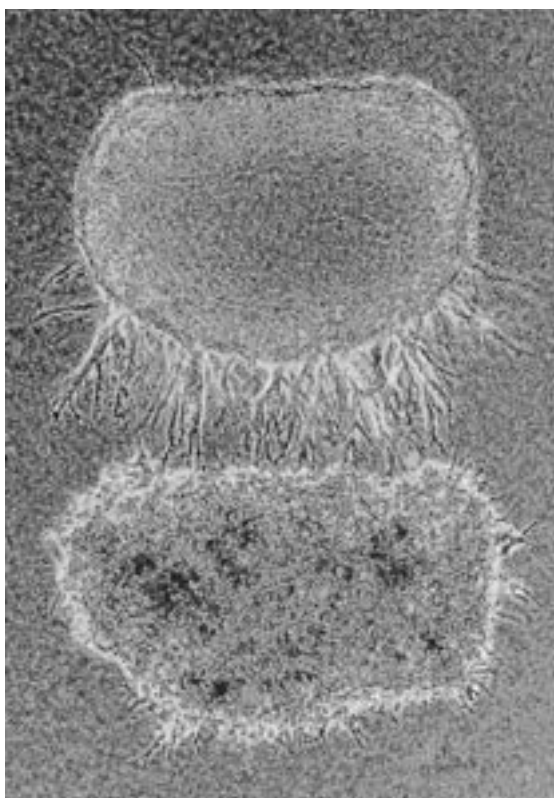
Cajal himself, it turns out, had the right idea. He proposed that the target tissues might release certain diffusible chemicals that, like a trail of bread crumbs, could lure the advancing axons from afar. Following this path, a team led by Marc Tessier-Lavigne of the University of California at San Francisco and the Howard Hughes Medical Institute identified two such chemotropic proteins. It has christened them netrin-1 and netrin-2, after the Sanskrit *netr,* meaning "one who guides."

Both proteins promote and orient the growth of so-called commissural axons in the developing spinal cord of chickens and rodents. These axons branch from nerve cells in the dorsal spinal cord and travel around its circumference to tissues in the front known as the floor plate. From there, they turn toward the brain. Studies done in vitro have shown that a collection of floor-plate cells can elicit axonal outgrowth of this kind from dorsal spinal-cord explants. Nevertheless, because the floor plate is so small, workers had been unable to isolate its active ingredients.

Tessier-Lavigne and his colleagues managed to avoid that problem altogether. They compared the floor plate's allure with that of more accessible tissues and found that the cell membranes in a developing chick brain could also draw commissural axons at a distance. The team purified the netrins from some 25,000 chick brains. To confirm that these proteins were indeed the spinal cord's chemical bait, the group introduced netrin-1 RNA into a line of mammalian cells. These custom-made cells then produced netrin-1 and attracted axons as floor-plate cells would.

Although both netrin-1 and netrin-2 were present in the chick membrane, floor-plate cells make only netrin-1. "The netrin-1 transcript is expressed at high levels in the floor plate," Tessier-Lavigne says, "whereas netrin-2 is expressed at lower levels over the ventral two thirds of the spinal cord." He speculates that this distribution might explain the path commissural axons typically take. Because higher levels of netrin-1 linger near the floor plate, the outgrowing axons most likely travel toward an ever increasing amount of netrin to reach their destination.

As further evidence that the netrins govern this growth, the same pattern of circumferential migration seems to occur in other species. The researchers have discovered that the netrins resemble unc-6, a protein that guides the growth of certain axons in a nematode. And Corey S. Goodman's laboratory at the University of California at Berkeley



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BATTERING RAMS—or growth cones from commissural axons—are lured toward floor-plate cells by chemical cues.