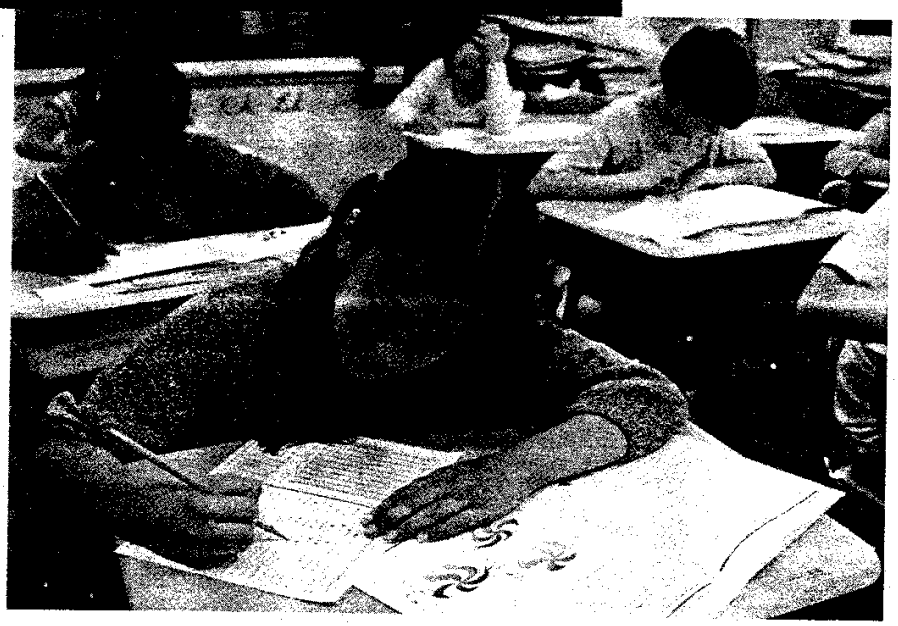
One of the mantras of American schools is that students are being prepared for "full participation in a more complex world" of technology, multiple health care options, rapid-fire communications, and public policy debates. But as we move into a world where intelligence may be the individual's most necessary resource—necessary not only to succeed but to cope at all—the persistent, major differences among us in sheer brainpower, which we call "IQ," may stand in the way of today's dream of greater social equality.

by Linda S. Gottfredson, Ph.D.



Pretending that Intelligence Doesn't Matter

Intelligence research, a pioneering field of modern neuroscience, began with Charles Darwin's cousin, Sir Francis Galton, and has drawn on the work of psychologists, neurologists, geneticists, and educators for more than a century. In our time, writes Linda Gottfredson, co-director of the Delaware-Johns Hopkins Project for the Study of Intelligence and Society, this discipline has established certain fundamental facts about the nature and measurement of intelligence and its impact on our "life chances." The problem is that these facts, well accepted by intelligence researchers, clash—or are seen

In Cerebrum, 2(3), Summer 2000, 75-96.

to clash—with our era's interpretation of democratic values.

The reaction of the media, Gottfredson argues, has been a "spasm of denial," a persistent misrepresentation of intelligence research to the public. In practical life, from school to work to public policy, the response has been to pretend that significant, lifelong differences in general intelligence simply do not exist. For that we will pay a high price, says Gottfredson, and the highest will be paid by those who can ill afford it—our least able citizens.

The first public broadside against the new field of intelligence research was struck in 1922 by the journalist Walter Lippmann, who criticized the swelling cadre of IQ-test enthusiasts for "pretentious" claims, "abuse of scientific method," and a "New Snobbery."[1] In intervening decades, thousands of scientists have entered the field, some bent on testing the claims that they initially thought dubious. Representing disciplines from genetics to sociology, these scientists have produced a vast body of evidence about why people differ in intelligence, how durable those differences are, and what they mean for us as individuals and as a society. As befits a vibrant, interdisciplinary endeavor, the field's scientists scarcely agree on all matters, but they have forged a consensus on certain fundamental facts—on the ABC's, so to speak. Their conclusion is that differences in general intelligence are real, stubborn, and important.

Yet the public controversy over intelligence seems little changed since Lippmann's day. If anything, it has become more vocal, with critics dismissing even the ABC's of the field as outmoded ideology. At times, indeed, it seems as though these critics wish to fend off the very evidence that they had long demanded.

From the perspective of experts on intelligence, the controversy over the 1994 book *The Bell Curve,* although it echoed like a thunderclap in public discourse, was but the latest of the convulsions that have seized the public when certain facts and theories about intelligence have come to light. Clashes between science and society are not new, of course; scientific knowledge often brings with it the threat of destroying cherished hopes and values. The alarmed reaction to Darwin's *Origin of Species,* a work nearing the 150th anniversary of its publication, still persists, like a radioactive danger zone in American public school politics.

What scientists studying intelligence have discovered, in essence, is that people differ greatly in intelligence and those differences affect our life chances. Our different IQs persist throughout our lives because we each inherit different versions of the genes for intelligence. These natural variations in mental capability make some degree of social inequality inevitable in a free society. Ensuring that all citizens have an equal opportunity to get ahead on the basis of their abilities and efforts cannot eradicate that inequality. Only eliminating or drastically reducing individual freedom can do so. That is the democratic dilemma.

What the critics of intelligence research purport to fear is that the conclusions of intelligence research will undermine democratic values: specifically, that they will lead to denigrating certain groups of people and

even denying them their rights. So strong is this fear that, while some critics vehemently reject the scientific claims of intelligence research, others believe those claims to be true but dangerous enough to be suppressed, for the public good.

But denying the thorny dilemmas created by differences in intelligence is neither feasible nor wise. It exacts enormous social costs and undermines the democratic values to which would-be censors appeal.

Let us back up and first examine exactly what the opinion leaders who are not scientific experts on IQ are protesting so vigorously and what the scientific evidence actually says about intelligence.

A SPASM OF DENIAL

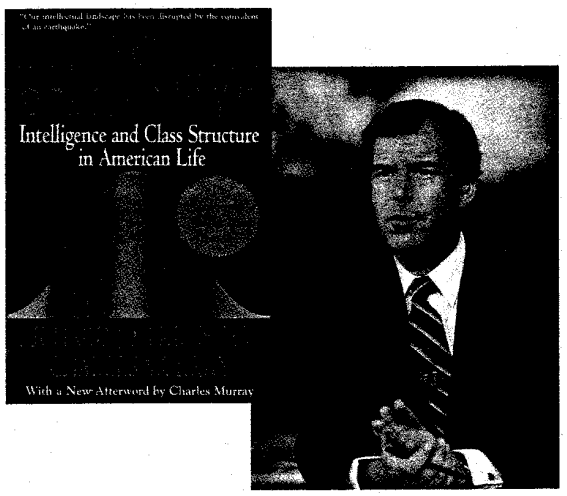
A 1988 survey of IQ experts, journalists, and science editors[2] revealed that the journalists and editors hold views in nearly diametric opposition to those of the IQ experts. The survey's analysis of the major newspapers and magazines revealed, not surprisingly, that their coverage of intelligence is "quite inaccurate." News stories, for instance, usually leave the false impression that mental tests are culturally biased and that only fringe scientists think that genes have an important influence on intelligence. The polarized views in the survey cannot be attributed to differences in political ideology: All three groups described themselves as liberal and supportive of "strong affirmative action."

Reactions to *The Bell Curve* ranged from high praise to low blows, but most journalists and academics who spoke publicly condemned it. Accused of promoting pseudoscience, the authors, Richard Herrnstein and Charles Murray, actually built their analyses on hard facts about intelligence—facts found in any good textbook on the subject.[3] It was the critics themselves who tended to be spouting nonsense.

Dismayed by the media disinformation attending *The Bell Curve* controversy, 52 prominent researchers from 34 universities and research centers published a *Wall Street Journal* editorial page statement in 1994 called "Mainstream Science on Intelligence."

Natural variations in mental capability make some degree of social inequality inevitable in a free society. Ensuring that all citizens have an equal opportunity to get ahead on the basis of their abilities and efforts cannot eradicate that inequality.

These scientists, the antithesis of ideologues, have published thousands of scientific articles and hundreds of books defining the frontiers of intelligence research. They include many recipients of coveted awards and many past presidents of major scientific associations. Appearing several months into the firestorm over *The Bell Curve,* the joint statement simply recited the most settled facts in the field, facts that had been depicted over and over again in news and commentary as "controversial" or "discredited." A second consensus statement appeared two years later in the form of an official task



Publication of The Bell Curve in 1994 evoked a "spasm of denial" from the news media, says Gottfredson, including an ABC report with Peter Jennings suggesting that any belief in important human differences might pave the way for genocide.

force report from the most pertinent scientific organization, the American Psychological Association. "Intelligence: Knowns and Unknowns" offered essentially the same portrait of mainstream scientific opinion on the nature, origins, and predictive value of intelligence. Both statements suggested that *The Bell Curve's* portrayal of intelligence was basically accurate.[4] Neither statement had any discernible impact on media reporting.

Was getting to the truth the critics' real concern? Or was their aim, by any means possible, to overturn the claim that differences in intelligence create a decidedly unlevel playing field? Their strategy in ostensibly refuting the scientific case presented by *The Bell Curve* was to kick out at least one of the three essential legs supporting the case: that differences in intelligence are real, stubborn, and important. The evidence for all three is overwhelming, however, so critics generally conceded at least one of them (although which one varied among the critics). The result was a cacophony of conflicting complaints about the book's supposed errors; but this did not stop critics from joining arms to pronounce its science dead wrong.

Whether or not the critics addressed the book's scientific credibility (and many did not), virtually all treated its appearance in public as a moral crisis. Many dispensed with civility and fair play, as if released from normal codes of conduct. Some linked the authors to the most reviled figure of

the 20th century, Adolf Hitler, by portraying any belief in human difference as the first step on the slippery slope to genocide. Others fabricated elaborate webs of guilt by association in an attempt to taint the book, its sources (myself among them), or mental testing in general. An ABC news broadcast by Peter Jennings (aired on November 22, 1994) discussed the book with footage of Nazi doctors and concentration camps in the background.

DEMOCRATIC SENTIMENT AGAINST ITSELF

What danger do the book's conclusions present? The critics paint their answer in vivid hues calculated to inflame the democratic conscience. They suggest that if Americans came to believe that social inequality was partly genetic in origin, they would no longer find inequality unacceptable. Perhaps they would begin to argue that some social inequality is natural and therefore excusable. Natural inequality would then become an excuse, say the critics, to deprive the disadvantaged of their due, reversing the trend toward greater social equality and perhaps leading eventually to the enslavement or genocide of "inferior" peoples.

This catastrophic scenario culminates in the cataloguing of one worst case assumption after the other, ignoring a widely noted feature of the tragic genocides in the 20th century: They almost invariably targeted the more successful populations—the prosperous Kulaks in Russia, the Jewish population in Germany, the Ibos in Nigeria, the Armenians in Turkey, and the educated classes in Cambodia. In addition, state-sponsored mass murder has not been restricted to regimes that favor genetic explanations of human difference. Stalin in the Soviet Union and Pol Pot in Cambodia both espoused Marxist egalitarian ideologies in which human characteristics are determined by the socioeconomic environment. Stalin actually criminalized genetics and intelligence testing, and both he and Pol Pot methodically murdered millions of their citizens. If "hereditarianism" is yoked to Hitler and concentration camps, why is not "environmentalism" to Stalin and the killing fields of Cambodia? Neither deserves to be so linked, of course. Scientific conclusions neither restrain nor predestine tyranny. Nor do scientific facts by themselves necessitate any particular political response.

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The goal of the critics, even if they do not make it explicit, seems to be to prevent Americans from rejecting (or even debating) the notion of equal social outcomes as a defining element of a fair society. If our assumptions about the necessity of equal social outcomes were questioned, then we might also have to question the idea that any degree of inequality is prima facie evidence of illicit oppression yet to be rooted out. When critics impugn the very notion of such a reconsideration and portray it as the

first step toward tragedy, they indicate that they do not trust the American people to make certain political decisions. The same people who abolished slavery, dismantled racial segregation, and destroyed Hitler would, they seem to suggest, tumble headlong into a deadly fascism. To keep us from deciding "wrongly"—from wronging democracy itself—critics justify withholding information from us.

Yet these critics are able to mobilize controversy by appealing to the very egalitarian sentiments that they imply Americans at large lack. The most effective epithets in the debate over intelligence seem to be the more moderate ones that critics brandish—"elitist" or "undemocratic" rather than "fascist" or "racist." Terms like "elitist" stir a deep passion in the American soul. As Alexis de Tocqueville described it early in the nation's life:

> I think that democratic communities have a natural taste for freedom; left to themselves, they will seek it, cherish it, and view any privation of it with regret. But for equality their passion is ardent, insatiable, incessant, invincible; they call for equality in freedom; and if they cannot obtain that, they still call for equality in slavery. They will endure poverty, servitude, barbarism, but they will not endure aristocracy.[5]

The controversy over intelligence research is a struggle not between good and evil but over how to reconcile our visions of political and social equality with the implications of biological inequality.

Tocqueville describes how their repudiation of aristocracy causes Americans to deflect attention from their own advantages and to envy those with more. It would not have surprised him to see today's bright verbal classes—journalists and academics—loudly disclaiming the existence of any intellectual aristocracy. He also foresaw that differences in intelligence, "which will ever escape the laws of man," would become both more obvious and more noxious as they emerged as the last major barrier to a classless society. "When there is no more hereditary wealth, class privilege, or prerogatives of birth, and when every man derives his strength from himself alone, it becomes clear that the chief source of disparity between the fortunes of men lies in the mind...Hence the desire of equality always becomes more insatiable in proportion as equality is more complete."[6]

The controversy over intelligence research is a struggle not between good and evil but over how to reconcile our visions of political and social equality with the implications of biological inequality. The conflicts are real, and how they are handled affects us all.

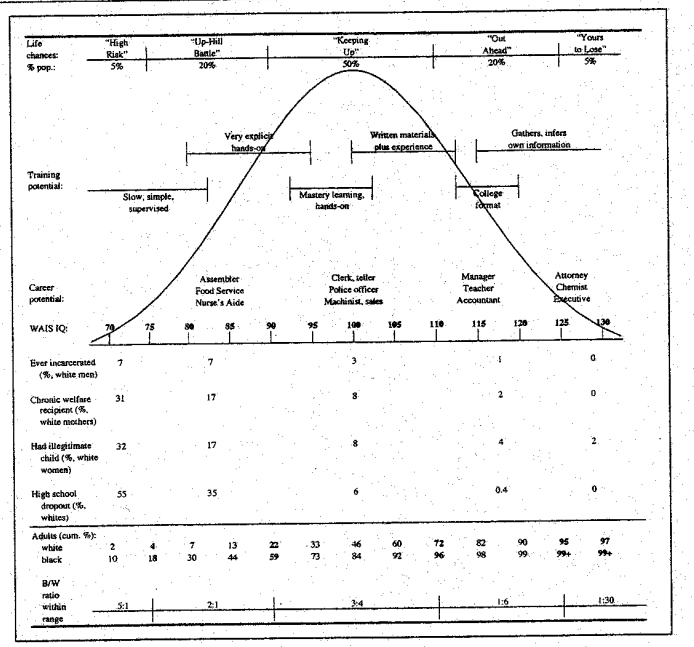
FUNDAMENTAL FACTS ABOUT INTELLIGENCE

Let us review some basic facts about intelligence, as summarized in the 1994 statement "Mainstream Science on Intelligence." Then we will consider two discoveries that show us how urgently we need to understand the price we are paying for flouting the reality of differences in intelligence. The illustration on page 82 shows some highlights of the "Mainstream" statement, condensing the ample research on the meaning of intelligence in everyday life.[7]

MEANING AND MEASUREMENT OF INTELLIGENCE. Intelligence is the very general ability to reason, plan, solve problems, think abstractly, comprehend complex ideas, learn quickly, and learn from experience. It is not our amount of knowledge but our ability to pick up and apply that knowledge. Intelligence is the ability to "catch on" and "make sense of things." IQ tests, whatever their format (such as paper-and-pencil or oral) or manifest content (such as numbers, words, or pictures), measure this ability very well. These tests are not culturally biased against African-American or other native-born, English-speaking peoples in the United States.

IQ tests are "normed" so that the average score at all ages is set at IQ 100, and two-thirds of each age group falls between IQ 85 and 115. In other words, IQ scores rank people relative to their age mates; they do not measure absolute mental horsepower. Because overall mental competence increases through at least adolescence, then tends to fade in old age, IQ scores, though always relative to age mates, do not reflect age differences. An IQ score of 100, for example, would denote a higher level of functional competence in an older as opposed to a young child and, conversely, in a young as opposed to an older adult.

Tocqueville predicted more than a century ago that when freedom and equal opportunity made clear that "the chief source of disparity between the fortunes of men lies in the mind," the democratic passion for equality would be vexed. But, he said, differences in intelligence "will ever escape the laws of man."



When differences in intelligence are graphed, the average is IQ 100. The percentage of those with greater or lesser intelligence becomes progressively lower toward the extremes, creating the "bell curve" so common in visually portraying human differences from height to longevity. Here, Gottfredson shows in brief summary what has been discovered about the impact of different levels of intelligence on "life chances" and the ability to perform some common tasks.

As shown in the illustration, when differences in IQ are graphed they array themselves roughly in a bell-shaped curve. In the United States, the bell curve is centered on IQ 100. At the extremes, about 3 percent of our population falls below the threshold for borderline mental retardation (roughly IQ 70) and 3 percent above the threshold for being gifted (IQ 130).

Much new research is examining intelligence as a property of the brain—for instance, by looking at speed of neural transmission, glucose (energy) uptake, and electrical activity in the brain. It finds, for instance, that smarter people have larger brains. Their brains also seem to work more quickly and efficiently, because they transmit electrical nerve impulses faster and use less glucose (energy) to solve mental problems. Research on brain waves (specifically, on average evoked potentials) shows that the brains of smarter people respond with greater speed and complexity even to the simplest information, such as a tone. "Reaction time" (RT) studies, which measure how quickly people make exceedingly

simple decisions, also show that IQ correlates with sheer processing speed. A typical RT task requires moving one's finger off a "home" button to press a second button when it lights. How fast one releases the first button ("decision time") correlates with IQ, but how fast one reaches the second button ("movement time") does not. The more buttons from which to choose, the longer all people's decision times and the more successfully their differences in mental speed predict their IQs.

This sort of research aims to pinpoint the differences in our mental hardware or software that can explain, most fundamentally, the wide differences in our ability to think, learn, and solve problems. A second strategy for plumbing the nature of intelligence has been to determine which aspects of brain structure or function are activated when we solve complex mental tasks. This approach is illustrated by the recent British-German study in which researchers used positron emission tomography to see which regions of the brain were activated when peoples solved novel problems.[8] They found that having people solve complex tasks as opposed to simple ones recruited a specific portion of the brain—the lateral frontal cortex—to deal with that extra complexity. They also found that tasks with very different kinds of content—spatial, verbal, and perceuptuo-motor—activated the same part of the brain. Research like this, which takes the study of intelligence deeper into the brain, supports ever more convincingly the IQ experts' conlcusion that intelligence is a highly general, biologically grounded capacity for processing information of any kind.

GROUP DIFFERENCES. Individuals in all racial-ethnic groups can be found at all levels of intelligence, from the lowest to the highest. Groups differ, however, in where their members tend to cluster along the IQ line. The bell curve for American whites is centered roughly on IQ 100; that for American blacks on 85; that for different Hispanic-American groups midway between those for blacks and whites; and that for Asian and Jewish Americans somewhere above that for white gentiles.

PRACTICAL SIGNIFICANCE. IQ is probably more strongly related to key educational, occupational, economic, and social outcomes in a person's life than is any other single, measurable human trait. The strength of the relationship does vary, though. It is very strong in some arenas (education and training), moderate in others (social competence), and modest but consistent in others (being law-abiding). A person's intelligence level guarantees neither success nor failure in life, of course, because many other personal traits and circumstances come into play. Being brighter, however, always tilts the odds in one's favor to some degree, because virtually all daily activities require some reasoning and decision making—that is, an exercise of general intelligence. The

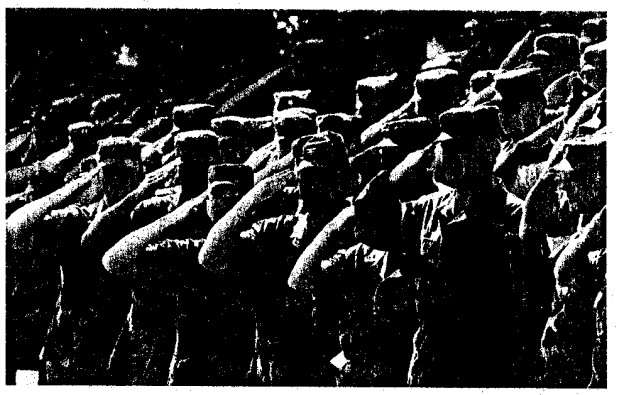
IQ is probably more strongly related to key educational, occupational, economic, and social outcomes in a person's life than is any other single, measurable human trait.

relative advantages of higher intelligence increase whenever activities or circumstances are more complex (novel, ambiguous, changing, unpredictable, or multifaceted) and thus require more reasoning and decision making.

Other intellectual and nonintellectual talents, as well as certain personality traits, may also be essential in many endeavors. Some researchers refer to them as other "intelligences," but none has been shown to have the breadth or depth of impact of general intelligence. Education theorist Howard Gardner proposes eight other "intelligences" (see the Fall 1999 issue of *Cerebrum* for a discussion of his theory). His theory is popular among educators, perhaps because it seems more "democratic." He has never developed a method of measuring his proposed intelligences, however, so we have no way of knowing whether they really are separate from general intelligence or have any practical value. Multiple-intelligence theories nonetheless encourage the wishful thinking that all people can be "smart" in some important way, and therefore succeed in school and elsewhere, if only they are taught with an emphasis on their particular intelligence. The evidence suggests otherwise. One of the firmest facts about intelligence is that it forms the backbone of every major mental aptitude ever studied, including verbal, quantitative, spatial, mechanical, and clerical.[9]

By showing the typical IQ levels of people who succeed at different levels of training and employment, the illustration on page 82 also demonstrates the practical importance of general intelligence. Few occupations are out of reach, on the basis of intelligence, for people above the 90th percentile of general intelligence (IQ 120), but virtually none is within ready reach for those below the 10th (IQ 80). Indeed, the military is forbidden by law to induct anyone below the equivalent of IQ 80 and it currently inducts no one below about IQ 85. Just as the odds for obtaining a higher education and a good job rise steadily with a higher IQ, the likelihood of social pathology falls rapidly. The pathways by which intelligence exerts its effects are not entirely clear, but its impact seems substantial. The odds of young white adults being incarcerated, being chronically on welfare, bearing illegitimate children, and dropping out of high school all tend at least to double at each lower range of IQ of the five shown in the illustration.

SOURCES AND STABILITY OF WITHIN-GROUP DIFFERENCES. People differ in intelligence because of both their genes and their experience. To estimate what proportion of the IQ differences among people stem from each source, scientists study identical twins who are reared apart, biologically related children reared together by adoptive parents, and other combinations of genetic and environmental influences. They have found that IQ differences, depending on factors such as age, as we will see later, range from 40 to 80 percent heritable (or genetic). The more alike our environments become over time, the less variable we will be in intelligence. Even if all environments were identical, however, much variability in IQ would remain. As the variability owing to environmental influences shrinks, the



The U.S. military is prohibited by law from inducting anyone below IQ 80, and in practice inducts no one below IQ 85, an example of the odds that face those with lower intelligence.

heritability of the remaining IQ differences grows. Obviously, with the elimination of any difference caused by the environment, all remaining variability would be entirely genetic in origin; the heritability of intelligence would rise to 100 percent. This surprises and disappoints many people, who hope that by making environments equal, intelligence can be made equal.

Because both genes and environments are at work, and because both differ even for siblings, biological siblings differ considerably from one another. Siblings differ among themselves by an average of 12 IQ points; strangers differ by an average of 17 IQ points.

"Genetic" does not mean "fixed" or "unchangeable." Just as genetically caused differences are not necessarily irremediable (consider diabetes and poor vision), environmental effects are not necessarily reversible (consider lead poisoning and head injuries). Both sources of low IQ may be preventable to some extent. Genetic screening and gene therapy, for instance, are both intended to prevent genetic disorders such as mental retardation. There is no effective means, as yet, for raising low IQs permanently.

SOURCE AND STABILITY OF BETWEEN-GROUP DIFFERENCES. There is no persuasive evidence that the IQ bell curves for different racial-ethnic groups are converging over time, and they differ as much when children leave high school as when they enter kindergarten. Racial gaps in amount learned grow through the school years, however, because intelligence affects the rate at which

Six Examples of Simple vs. More Complex IQ Test Items

Directions	Simple item	Complex item
1. Compute	60 x 3 =	Sarah drove 3 hours yesterday at an average speed of 60 miles per hour. How many miles did she drive?
2. Define	Conceal	Encumber
3. State one similarity	Dog — Lion	Praise — Punishment
4. Give the next 2 numbers	3, 5, 7, 9, __, __	10, 9, 8, 9, 8, 7, __, __
5. Reproduce pattern with blocks whose sides are ☐ ■ ◥	Use 4 blocks:	Use 9 blocks:
6. Complete the pattern	A B C D E	A B C D E

Modern IQ tests carefully isolate and assess the ability to deal with complexity as such, apart from any particular content that might be related to cultural background.

students learn when exposed to the same instruction. The reasons for the differences in IQ within any racial-ethnic group appear to be the same for all groups: a mixture of genetic and environmental influences.

On the issue that triggered such concern over *The Bell Curve*—why IQ bell curves differ from one racial-ethnic group to another—scientists as yet have found no definitive answer. When we control for socioeconomic background, differences between races remain. Most experts believe that environment is important, but genetics may be involved, too. Because most African-Americans and many others in the United States have mixed ancestry, the results of intelligence research, like those of any other social science, relate to some unclear mixture of social and biological distinctions among groups.

IMPLICATIONS FOR SOCIAL POLICY. As noted earlier, research findings neither dictate nor preclude any particular social policy, but they may suggest which strategies for reaching our goals are likely to be most effective and have the fewest ill effects.

TWO CRUCIAL DISCOVERIES

Two discoveries about intelligence confirm its pivotal role in shaping our life chances.

The first is that intelligence is a pervasively useful tool. Critics commonly assert, mistakenly, that intelligence is a narrow "academic" skill, an artifact of social class

Understanding a bus or train schedule is just one challenge beyond the reach of significant numbers of lower IQ Americans. "Higher intelligence is a pervasively useful tool in every day life," writes Gottfredson.

background, or simply a reflection of acquired knowledge—meaning that it need not be taken seriously in many, if any, real-life settings. In fact, however, intelligence is such a general ability, having to do with processing information of any kind—apprehending, comprehending, transforming, and applying it—that it applies everywhere in everyday life: in our ability to turn things over in our minds, to fill in gaps, to see connections, to draw distinctions, and so on. It can take the form of aptness in reasoning, problem solving, learning complex material (as distinct from rote memorization), and other critical thinking skills—all general intellectual skills that observe no boundaries of subject matter, setting, or stage in life.

A look at the hypothetical IQ test items shown on page 86 shows how IQ tests call forth this same general ability. They pose questions that steadily increase in the complexity of their information-processing demands. The first column shows relatively simple items and the second relatively complex ones. This difference—complexity—is the active ingredient in IQ tests. It has nothing to do with the general content of the task, which is similar across the two columns. Instead, the more complex items require processing more bits of information, drawing more inferences, and the like, regardless of whether the information is carried by words, numbers, or figures. Differences in people's ability to deal with

Test	Examples of Everyday Tasks: Simple	Complex
NALS Literacy Test*		
Prose	Locate one piece of information in a sports article.	Contrast views expressed in two editorials on technologies available to make fuel-efficient cars.
Document	Locate time of meeting on a form.	Use bus schedule to determine appropriate bus for given set of conditions.
Quantitative scale	Total a bank deposit entry.	Using eligibility pamphlet, calculate the yearly amount a couple would receive for basic supplemental security income.
TOFHLA Health Literacy Test*		
Understanding role	When next appointment is scheduled, from appointment slip.	Understand hospital informed consent document.
Following instructions	How many times a prescription can be filled, from label on a vial.	Understand instructions for preparing for upper gastrointestinal tract radiographic procedure.
Daily Tasks		
Driving	Drive a familiar route in light traffic under good conditions.	Drive an unfamiliar route in heavy traffic and bad weather.
Health self care	Take a 10-day course of antibiotics, one tablet a day.	Monitor and adjust one's diet, exercise, and medication on a daily basis (people with diabetes, hypertension, etc.).
Child care	Monitor a familiar toddler in a childproofed home.	Monitor two unfamiliar toddlers at a public pool.
Budgeting	With stable income and expenses.	With unpredictable income and changing expenses.

NALS = National Adult Literacy Survey
TOFHLA = Test of Functional Health Literacy in Adults
* These are abbreviated designations of simulated tasks using actual forms, documents, etc.

What does research show about how well people with different levels of intelligence are able to carry out everyday tasks? And why are we doing so little to simplify those tasks?

such complexity, not any familiarity with the obvious content of test items—which is where the charge of cultural bias mistakenly appears—account for their differences in IQ-test performance.

Now we see why intelligence is useful in so many realms of life. Life is complex and getting more so all the time. Virtually everything we do on a daily basis requires taking in, understanding, or providing information—whether it be deciphering job applications, tax forms, bus schedules, or the moods of friends and lovers; or keeping up with new rules and regulations, changing technology in our homes and cars, and our children's latest escapades. Experience helps, but it never negates the advantages of better critical thinking skills. Above-average intelligence may be decisive in only a few of these activities, but it is useful in all. Low intelligence is like a headwind that one must constantly battle. High intelligence is a tailwind, always helping one move ahead, sometimes with little conscious effort. These persistent winds gradually create enormous differences in the outcomes of people's lives over the years.

The table above gives examples of

everyday tasks in which good performance enhances one's quality of life. The first five pairs of items are drawn from two tests of functional literacy, one developed for the U.S. Department of Education (the National Adult Literacy Survey or NALS) and one by health scientists (Test of Functional Health Literacy in Adults, TOFHLA). As the table suggests, and as the U.S. Department of Education reports in detail, many citizens have trouble carrying out routine transactions with organizations (such as the U.S. Post Office, restaurants, social welfare agencies, and credit card companies) and understanding events of the day (sports stories, trends in oil exports) or their own personal options (welfare benefits, discount for early payment of bills). Fully 15 percent of white adults are able to function on a routine basis only at what I have labeled the "simple" level (NALS Level 1); only a quarter of white adults are able to function routinely at or above the "complex" level (NALS Levels 4 or 5).

A high proportion of patients in urban public hospitals fail the "simple" health literacy tasks in this table, such as understanding standard prescription labels. The disadvantages of below-average intelligence are greatest where health treatments (such as multidrug, multidose regimens) and self-management (for instance, of chronic diseases such as diabetes) are inherently complex. Low literacy is sometimes literally a matter of life and death. The last four pairs of tasks show how other daily tasks vary in complexity. A large, longitudinal study of ex-servicemen in Australia found that safe driving relates to IQ level. Rates of death from motor vehicle accidents doubled and then tripled across three ranges of normal IQ: In the 100-115-IQ range, there were 51 deaths per 10,000 men; at IQ 85-100, there were 92 deaths; and at IQ 80-85, there were 147 deaths.

Higher intelligence is a pervasively useful tool in daily life, and pretending otherwise has no effect on the advantages it brings.

The second discovery significantly raises the stakes of the genetic portion of IQ: The shared effects of a family environment on intelligence disappear with age. Social scientists have long believed that the parents' income, education, and child-rearing style had a strong, cumulative impact on children's intelligence. These characteristics would make siblings more like one another and less like children in different households. In the last decade, behavioral geneticists were startled to discover that these shared effects of the family virtually disappear by the time the children reach adolescence. The heritability of intelligence fairly rapidly becomes the dominant influence, rising from 40 percent of the explanation of differences in IQ scores in the pre-school years, to 60 percent by adolescence, to 80 percent in old age. This discovery was totally unexpected; the scientists, like everyone else, had falsely assumed that the "slings and arrows of outrageous fortune" (good

Higher intelligence is a pervasively useful tool in daily life, and pretending otherwise has no effect on the advantages it brings.

or bad) accumulate with age to muffle genetic effects.

Studies of children who have become siblings through adoption illustrate this counterintuitive discovery. They become less like one another as they get older, but more like their biological parents and biological siblings, whom they have never met. By adolescence, adopted siblings tend to be no more alike in IQ than complete strangers. On the other hand, identical twins reared apart are almost as similar as identical twins reared together and considerably more similar than fraternal twins reared together. Although the age-linked rise in heritability remains unexplained, the major hypothesis is that, as youths become more independent of rearing influences, and so freer to direct their own lives, they seek experiences and social niches that blend with and reinforce their genetic endowments. We are not passive creatures of circumstance, molded by either our genes or our environments without protest. Rather, we are active participants in creating ourselves. When free to do so, we follow our genetic proclivities in choosing and creating experiences that will influence what we become.

We are not passive creatures of circumstance, molded by either our genes or our environments without protest. Rather, we are active participants in creating ourselves.

There is not much research on genetic and environmental factors in IQ at the extremes of social deprivation and advantage; but available results, to date, show that perhaps the middle 80 percent of families provide environments that—in practice, despite even considerable differences in socioeconomic circumstances—are about equivalent for the development of a child's general intelligence. Most settings in which children are educated are also about equivalent for the development of IQ. Special interventions to raise low IQ's are somewhat successful with young children, but the effects of these interventions almost always fade out as children approach early adolescence. Knowing that the effects of shared family and school environments on IQ fade over time says nothing, of course, about those environments' possible effects on—and value for—more malleable or more specific mental skills and knowledge.

Some environmental factors do have important effects on IQ, but—surprisingly—they are things that siblings do not share and that make them less alike with age. There is little research or theory yet on what those non-shared influences might be, but they probably include biological factors such as differences in prenatal conditions and histories of illness and accidents. They may also include differences in how families react to dissimilar members. Environmental effects, then, turn out to be highly specific. They affect one person at a time and perhaps in unpredictable ways.

By providing strong evidence against the theory of "family effects," behavioral genetics research tells us that providing middle-class homes and schools to all children as a way to narrow differences in intelligence

—and differences in its highly correlated outcomes, such as academic achievement—may consistently disappoint our hopes.

THE PRICE OF PRETENSE

These, then, are the basic conclusions shared by psychologists and others who study IQ. Critics urge upon us certain conclusions that they consider more "welcome," assuming that even if those conclusions are false, they will do no harm. Would-be censors assume that certain truths do harm but noble lies do not. These critics and censors err. Deceit of any stripe corrodes public trust, and pretending that intelligence does not matter squanders opportunities to ameliorate the individual problems and social tradeoffs created by stubborn differences in intelligence. This pretense also encourages a flight from measuring or even discussing intelligence, which tramples important values in our society.

SCHOOLING AS THE GREAT LEVELER. In no other American institution is the democratic passion for equality as strong as in the public schools. They are charged with counteracting the advantages and disadvantages of birth to create a level playing field for personal development and social success. Social scientists often leap to the conclusion that any correlation between a negative family background and lack of adult success reflects a failure of schools to do their job. Evidence on intelligence shows that this is the wrong conclusion, one that confuses two competing goals for schools. The first goal is to provide all students with an equal opportunity to exercise their talents; the second, and incompatible, goal is to attempt to equalize their talents.

We can expect schools to do many good things, including teaching specific skills and knowledge as well as civic virtues, but they cannot equalize intellectual talent. Therefore they cannot equalize learning, either. When students are free to learn at their own pace, the brightest students often learn at least five times faster than the slowest. As years pass, the widening gaps in what they have learned create, by the higher grades, the appearance that schools are magnifying inequalities. Some researchers are now concerned that discomfort with that result is fostering instructional arrangements that, while augmenting opportunities for the slowest, withhold opportunities from the fastest. As one researcher grimly put it, education theorists tend to be "pedagogical plainsmen 'preferring intellectual plains to intellectual hills and valleys'... [and are] devoted to 'the weary process of shoveling to fill valleys and steady erosion to remove mountains of human talent.'"[10]

Pretending that intelligence does not matter squanders opportunities to ameliorate the individual problems and social tradeoffs created by stubborn differences in intelligence.

The conundrum facing the schools is real, and thoughtful people disagree on how a democratic society should tackle it. Unfortunately, however, those who propose or enact school policy often deny the

conundrum and the intellectual inequalities that create it. That denial transforms talent, the educator's ally, into an enemy. Wishing not to accept that some students are naturally slower than others, many educators disparage intellectual ability itself. They treat differences in intellectual ability as signals of social advantage (or disadvantage) to be expunged or at least not bolstered by, for example, providing separate classes for either the intellectually gifted or mentally retarded. Hence these educators attack ability grouping and tracking as elitist and undemocratic, and their preferred policy (often protested by parents and teachers) is to use the same instructional methods to teach the same content in the same classrooms to all students. The homogenization of instruction broadcasts a democratic intent, but at the price of dampening the intellectual development of many students, fast and slow alike.

One of the costs that the intellectual classes exact when they pretend that intelligence does not matter is borne by those who can bear it least—the less able themselves.

Taking differences in intelligence seriously does not mean giving up on slower students. It means learning better how to move them forward without trammeling opportunities for their faster peers. Today, a complaint heard in Washington, the business world, and schools themselves is that all students are working below their potential, accounting for the United States's dismal showing in international comparisons. If achievement is a goal, then research on intelligence indicates that instruction should not be homogenized by the latest trend such as cooperative learning or discovery learning. Nor must it fall prey to the false hope that all children can learn equally well if only we target the same material to their strongest "intelligence"—musical, spatial, bodily, interpersonal, or whatnot. Instead, instruction should be tailored to the level of complexity that children can readily process and retain (which the illustration on page 82 indicates differs widely). As the late educational psychologist Richard Snow and his colleagues showed, the instructional style that most helps slow students (highly structured, concrete, step-by-step instruction that leaves no gaps for students to fill in) impedes the learning of bright students, who profit most from more abstract, incomplete instruction that allows them to restructure information in unique ways. One-size-fits-all instruction squanders all students' best chances for progress, even when it comes dressed up as teaching to multiple intelligences.

THE WORSENING DEMOCRATIC DILEMMA. One of the costs that the intellectual classes exact when they pretend that intelligence does not matter is borne by those who can bear it least—the less able themselves. Insulated from the day-to-day life of the common man, the professional intellectual seems not to recognize that life is often an uphill battle for people of below-average but nonretarded intelligence. As I illustrated earlier, those with low intelligence face

As new technology, including computers, comes to dominate everyday life, on and off the job, both the advantages of higher intelligence and the disadvantages of lower intelligence increase.

a disadvantage in virtually every direction they turn. Each new complexity introduced into our lives—the Internet only the latest—tilts the odds toward more intelligent people and against less intelligent people, often pushing the latter closer to the margins of economic life.

The new "digital divide" serves only to widen the rift in American society. Both the white and black underclasses have grown in recent decades. Public policy analysts anguish over this trend, but seem unwilling to link it with variation in IQ. Many roundly rejected *The Bell Curve's* effort to explore that link, but there are studies showing that lower-IQ people have had trouble keeping up with their compatriots as occupations, technology, and social institutions have become more complex. Civilian employers avoid hiring the "marginal men" (IQ 80-85) whom the military will not induct either—men who, in an earlier age, could have earned a decent living with a strong back and a good attitude. Growing personal freedom, whether for choosing occupations or lifestyles, also gives an edge to bright people.

Freedom and technology are often seen as democracy's twin engines of progress, but they leave some citizens in the dust as they help others win the race. Compassion does not consist of pretending that we are all equally intelligent, but in understanding how the growing complexities of modern life pose special challenges for lower-IQ individuals, whatever their race or family background, and how they can be helped. Two practical examples of reversing

the unnecessary complexities in everyday life are the efforts to simplify health education materials and new, more explicit labels on over-the-counter drugs. It is time to devote more attention to helping less able citizens cope with the complexities of today's world.

RE-ENGINEERING MOTHER NATURE. The mistaken theory of "shared family effects" as an attempt to explain differences in intelligence and academic achievement has encouraged a single approach to improving the achievement of children from disadvantaged environments: provide them the equivalent of homes and schools in middle-class neighborhoods. Equalizing resources in this way may be worthy for many reasons, but it will not equalize students' eventual achievement. As we saw, even putting children into the same middle-class homes, whether by adoption or by birth, does not make them more alike in intelligence by adolescence than they would be on the basis of genes alone.

Nature, however, will always defeat the most dedicated social leveler's attempt to equalize people by providing them with the same environment, simply because brighter people tend to make better use of that environment.

Any effort to rid the nation of socio-economic inequality by redistributing wealth, opportunities, and jobs among its citizens is, at root, a program to nullify the effects of genetics. We can debate whether such a program is practical or wise. For example, it would seem to require perpetual and forceful social engineering to negate the advantages of greater competence. Nature, however, will always defeat the most dedicated social leveler's attempt to equalize people by providing them with the same environment, simply because brighter people tend to make better use of that environment.

Basing social policy on mistaken assumptions can make that policy ineffective and disappointing, but perhaps that is not the heaviest toll. If we cannot admit that nature plays a major role in creating social inequality, we must find a human culprit. The search for culprits grows, along with disappointment with attempts to level the playing field. The supposed guilty behavior is now said to be "institutionalized" or "unconscious," and thus impossible to disprove. All claims to merit that is based on intelligence become suspect as mere smokescreens for ill-gotten privilege. Any group that succeeds more than others incurs presumptive guilt. Nature's stubbornness is reinterpreted as man's ill will. In short, advocates who say that the effects of the family environment predominate have effectively transformed equality of outcome from a goal for a democratic society into a precondition. According to them, a naturally fair society would be an equal society; and fairness would thus require not debate about whether and how to satisfy the democratic passion, but coercion of an unwilling citizenry.

Anything that deflects energy from ushering in equality of outcome, such as

research into the genetic origins of intelligence and socioeconomic success, is treated as fresh evidence of that unwillingness, as the storm over *The Bell Curve* showed. Already there have been attempts to halt the search for the genes influencing normal intelligence, a search spearheaded by psychologist and behavioral geneticist Robert Plomin at the London Institute of Psychiatry. No doubt, similar forces are poised to impede research on the brain, if such research should stray from the question of how we are all alike. Ironically, if there is to be any hope of raising low intelligence, it probably lies in understanding and enhancing the physiology of the brain. It would seem prudent for us to work with nature, not against it.

THE FLIGHT FROM INTELLIGENCE

Increasingly, the regimen of denial requires that the racial disparities in academic skills that occasion finger-pointing during the school years be considered irrelevant in adulthood. In this regimen, there is no explanation other than discrimination for racial disparities in areas such as employment. In fact, unequal hiring rates have become prima facie evidence of illegal discrimination (in legal jargon "disparate impact"). Presumed guilty, employers must prove their innocence.

The amount of discriminatory treatment that favors or disfavors minorities today is unclear, making it tough to estimate what role it plays in widening or narrowing racial gaps in adult outcomes. What is clear, however, is that when individuals are treated in a color-blind manner, large average group differences in intelligence, whatever the origin of those differences, can be expected to produce racial inequality. The bottom row of the illustration on page 82 shows that the ratio of blacks to whites in different ranges of the IQ distribution—and so competition for particular kinds of training and employment—falls drastically at the higher ranges of the IQ continuum. The regimen of denial has it that there are equal proportions everywhere in a fair society, but, in fact, average differences in intelligence predict black-to-white ratios that drop from 5 to 1 in the lowest range of IQ (below IQ 75) to 1 to 30 in the highest (above IQ 125).

If there is to be any hope of raising low intelligence, it probably lies in understanding and enhancing the physiology of the brain. It would seem prudent for us to work with nature, not against it.

Employment rates actually do show this steep trend, with black representation falling fast at the higher job levels. The regimen of denial, however, interprets that trend as proof that discrimination is especially pernicious at the highest, most complex levels of education and employment. The most intellectually demanding settings, and the standards for entering them, therefore become the targets of greatest outrage and pressure for redress. It is no surprise that the Scholastic Achievement Test (SAT) was immediately singled out for elimination

in colleges that were newly forbidden to use racial preferences in admitting students. The same covert war on mental standards exists in hiring for jobs. With racial preferences now under fire, many personnel departments, especially in government agencies, are solving the "problem of disparate impact" by watering down the testing of intelligence, although without appearing to do so.

Some are redefining the concept of "competence" itself to mean a standard that yields similar scores for all demographic groups. For example, federal insistence on racially balanced police hiring has forced some locales to strip their police entrance exams of all meaningful mental demands, despite the clear threat this poses to public safety.[11] In short, when standards of mental competence must not produce "disparate impact," then that very competence itself inevitably becomes defined as a racial barrier that should be eradicated.

One cost of resolute denial of differences in IQ is thus to discourage—and even criminalize—standards for mental competence. Because critics are unable to stamp out varying levels of competence or to negate their real-world effects, differences in intelligence provide them with perpetual evidence of social evil at work. The gift of human intelligence becomes just another tool for oppressing the disadvantaged.

Surely we can put our minds to better use than denying the far-reaching differences among those minds. ■

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