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What Do We Know About Intelligence?

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THE TECHNIQUES, TOOLS, AND THEORIES of the study of intelligence undergird efforts to improve instruction, job training, and productivity as well as to diagnose and treat mental retardation, psychopathology, and school failure. The field's major product, the mental test, was often adopted early in the century, in Great Britain, for example, with the aim—and subsequent effect—of increasing educational opportunities for talented but less privileged youth.

According to the most vocal lay opinion today, however, the research on intelligence is "ideologically motivated," "mean-spirited," "bogus, nineteenth-century pseudo-science" bent on preserving social inequity. Basic conclusions are asserted to be their opposites, and acknowledged giants are depicted as fringe figures, while their long-discredited critics are lauded as mainstream thinkers.

These attacks on the study of intelligence, while often motivated by a strong democratic passion, are, at bottom, attacks on the successes of American democracy itself. As inequalities owing to such factors as bias and social advantage are eliminated in American society, inequalities owing to genetic factors increasingly stand out. The more social conditions become alike, the more genetic differences become the only differences. Intelligence is, of course, only one important difference and is itself both partly genetic and partly environmental in origin.

But just as equality of social condition strips away the importance of class and caste in developing and using natural talents, technological advance adds to the relative importance of intelligence in economic and social life. In less complex societies, people may get rather far on traits such as physical prowess and the sheer willingness to work hard. High intelligence, however, becomes an ever greater asset

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in a technological age, which increasingly requires and rewards quick learning and keen thinking. Paradoxically, then, the democratic effort to expunge the advantages of social origin gives greater weight to genetic differences in intelligence, and technology further augments their importance. Democracy does not eliminate social hierarchy but only shifts its basis from the conventional toward the genetic, especially the genetic differences in intelligence.

Rather than see this problem as a paradox endemic to democracy, many people have blamed the science that reveals it. Critics accuse scholars who study intelligence of preferring and creating the inequalities that modern democracy itself produces. As the scientific data have accumulated in recent decades and confirmed the paradox, so too have these critics' responses become more impassioned and shrill. Clearly, the data on intelligence touch a sensitive nerve.

Impressive evidence of media misrepresentation of the data on intelligence comes from the 1988 book *The IQ Controversy, the Media, and Public Policy* by Mark Snyderman and Stanley Rothman. Their large survey of IQ experts and journalists disclosed that the two groups held opposing views about basic findings—for example, about whether mental tests are culturally biased and whether race and class differences in IQ are solely environmental in origin. Snyderman and Rothman showed that news coverage in the major newspapers and news magazines reflected not the experts' views but primarily the journalists' contrary ones. The divergence between the two groups could not be traced to ideology, because the IQ experts were as left-liberal on the average as were the journalists. Like the journalists, most of the experts on intelligence favored strong affirmative-action measures and believed that American exploitation has contributed to Third World poverty.

Media portrayals of scientific knowledge on intelligence have not changed much for several decades. Public controversy over intelligence in the late 1960s drove many researchers out of the field and led most of the rest to be very cautious about voicing their opinions outside their specialties. A high wall developed around the subject, reinforced from both within and without, behind which researchers have worked warily for three decades. Research on intelligence has been effectively walled off, not only from the public, but also from the other social sciences. This barrier within the academy itself has meant that many of the social sciences, particularly sociology, anthropology, and education, have now miseducated generations of college students on those questions and problems having to do with issues of intelligence. This isolation has meant that the science has moved

relentlessly forward while public perceptions have remained frozen in the 1960s.

Striking evidence of how wide the gulf between public and scientific understanding has become emerged during the public debate over Richard Herrnstein and Charles Murray's *The Bell Curve.* Critics often dismiss the book as reflecting an ideologically motivated rehash of discredited notions that are out of step with modern psychological science: a "disingenuous," "anachronistic Social Darwinism," and "manifesto of conservative ideology," according to Stephen Jay Gould. For some, the book's key error is to claim that intelligence exists or, if it does, that it can be measured. Others argue that intelligence exists but does not measure anything very important. Some agree that it is important but that the races do not differ. And yet others agree that the races do differ, but it is misleading to say so because, in their view, intelligence is highly malleable. These mistaken claims are not new, but experts on intelligence have been astonished at the escalating degree and rancor of the discussion.

In response, more than fifty leading scholars of intelligence and allied fields published a statement last December ("Mainstream Science on Intelligence," that appeared in the *Wall Street Journal* of December 13, 1994) laying out twenty-five basic conclusions that they consider squarely within the mainstream of expert thinking. Simply stated, they concluded that differences in intelligence among individuals are real, can be measured accurately, and are important in school, work, and other of life's arenas. Disparities among races and social classes are also real, can be measured without bias, and are often important in social life. The sources of individual (and class) differences are known to be both environmental and genetic, but we have not yet discovered how to manipulate the environment to raise intelligence permanently. Average differences between racial groups are suspected, but not proven, to be both environmental and genetic in origin. They, too, have thus far resisted remediation.

Hardly bold or controversial within the field, these conclusions can be found in good psychology textbooks on intelligence, such as Nathan Brody's 1992 volume *Intelligence.*

I think that individual differences in intelligence, as assessed by standardized tests, relate to what individuals learn in schools and to their social mobility. And I think that scores on such tests are related, albeit weakly related, to race and social class background. In addition, I think we do not know how to substantially modify or eliminate individual differences in intelligence or the relationship between individual differences in intelligence and what is learned in schools. As long as this is true, individual differences in intelligence will relate to important social outcomes.

My point here is not that these basic conclusions are surely correct because most researchers of intelligence agree with them, but simply that they have become the views of the mainstream in the study of intelligence.

These are not conclusions that those who study intelligence wished to draw, but in fact they are ideas that many tried vigorously yet unsuccessfully to disprove. The first and very lively contest among pioneers in the then young study of intelligence, continuing well past mid-century, concerned whether there even exists a general mental ability as distinct from multiple, unrelated abilities. In another heated debate, a large cadre of IQ researchers in the 1960s and 1970s made concerted efforts to prove mental tests culturally biased. Ironically, it was the very vigor of attempts to disprove the reality and importance of general intelligence that in the end so clearly proved both.

Nathan Brody speaks for many in the field when he writes, in the preface to his textbook on intelligence, "If the world were as I would like it to be, what I think I have learned about intelligence would not be true." His motivation for delving into the field had been "a desire to demonstrate that [Arthur] Jensen was wrong." I suspect he also speaks for many when he describes his own lost egalitarian utopia.

> Children would be equally capable of learning and everyone would be well educated. Differences in status associated with different occupations would be minimized or eliminated. Individual differences, in whatever would be analogous to intelligence in such a world, would be of little relevance.

Many Americans have apparently assumed that almost everyone is talented in some notable way or else that talent is randomly distributed. Either circumstance, if true, would seem to impede development of any social hierarchy in a society emphasizing individual merit. Success and failure in such a system would be random with regard to both social class and racial background, thus minimizing invidious comparisons across groups. The common fear, implied in Brody's utopia, is that there exists a cognitive hierarchy that has biological roots and portends people's fates.

Research in intelligence excites fear by refuting the egalitarian presumptions about intelligence. It confirms that there are indeed many kinds of measurable talent, but that only some—and especially intelligence—seem to be of substantial social and economic importance in the modern world. It also reveals that such capabilities are not randomly distributed across families or social groups; nor are they entirely environmental in origin.

Americans have always prided themselves in repudiating Old World aristocracies and urging meritocracy instead. The nation's founding principles, by emphasizing individual freedom, promised to release individuals from the bondage (and advantage) of lineage to pursue their fortunes by dint of their own abilities and efforts. The current paradox is that social distinctions are not eradicated but rather in some sense replaced under a meritocracy. Intellectual advantage replaces social privilege in the competition to get ahead.

With technological progress, the need for intelligence only increases. As U.S. Secretary of Labor Robert Reich summed it up in his book *The Work of Nations*, the new economy puts a higher premium on "brains" and "the capacity for abstraction" than did the old. The information age creates a demand for more "symbolic analysts." Unskilled and even semi-skilled work continue to disappear; there is less use for workers carrying out narrow, routine, repetitive, and predictable sets of tasks that are either easily accomplished with the new technologies or shipped overseas. As the new economy advances, the fortunes of the brightest rise yet higher, while those of the least bright fall further back. This specter of social bifurcation is by now familiar and has been set out in national reports from *A Nation at Risk* to *Workforce 2000.*

It is not surprising that Americans in particular would want to deny such side effects in fostering equal opportunity and technological advance. As Tocqueville recognized early in our history, we have a taste for liberty but a passion for equality.

> For equality, [Americans'] 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.

The cognitive elite looks to be the new aristocracy.

What, then, does the research tell us—and not tell us—about differences in intelligence and their implications in social life? What are the realities? I consider recent developments on these matters in order to answer three general questions: What is intelligence? What creates differences in intelligence? How important are these differences in practical affairs?

What is intelligence? In everyday life we commonly refer to one another as smart or dumb, quick or slow, bright or dull, reflecting a uni-dimensional view of intelligence. The truth of that uni-dimensional view was the first hotly debated question in the study of intelli-

gence early in the century. The question has now been settled to the satisfaction of most researchers who study intelligence.

Advances in factor analysis have confirmed that there is one highly general factor; it is referred to as *g* (for the general mental ability factor). This can be derived from any large, diverse battery of mental tests and is also measured reasonably well by simple IQ scores on a standard test. Most researchers now use the concept *g* rather than intelligence because it is more precise and carries less emotional baggage.

By no means is *g* the only mental ability, but it is the most general and is thought to have the largest overall effect throughout social and economic life. It also turns out to be the major component of tests for more specific abilities, such as verbal and spatial aptitude, despite earlier attempts to expunge it from such tests. In particular, the factor-analytic tradition in mental testing, synthesized in John B. Carroll's *Human Cognitive Abilities: A Survey of Factor-Analytic Studies*, has confirmed a hierarchical (branching) model of mental abilities, ranging from the most general (*g*) at the apex to increasingly numerous and specific abilities at successively lower levels in the hierarchy. (Carroll has an article forthcoming in the journal *Intelligence* that disputes Stephen Jay Gould's long-discredited criticisms of factor-analytic *g*.)

Factor analysis clarifies the outward manifestations, not the inner workings, of intelligence. Nonetheless, those outward indicators disclose the one fact most critical so far in understanding the practical importance of *g*. The essence of *g* seems to be the ability to deal with complexity, regardless of the specific content to be mentally manipulated (symbols or shapes, science or social studies, books or tools). This essence is best reflected in such mental matters as abstract thinking, problem solving, and the ability to learn quickly and effectively. In other words, *g* is the general capacity one has for comprehending one's environment and figuring out how to deal with it.

Two lines of research have investigated the inner workings of intelligence during the last few decades. Both involve laboratory inquiry into the nature of information processing. The more recent line of research tends to be biological and reductionist because it concentrates on speed and accuracy of processing exceedingly simple stimuli (lights, tones, lines, and the like). The second approach, which emerged in the 1970s from the cognitive science revolution in psychology, favors the study of more complex processes (such as sustaining attention, classifying words, and mentally rotating shapes).

The former tends to reflect the "bottom-up" view that differences in higher level processes result from differences in the most elemental ones, which in turn may originate in neurological structures. The latter approach usually reflects the opposite or "top-down" view, which emphasizes cognitive strategies or "metacognition" and their susceptibility to experience and instruction. The former approach tends to view mental processing on the analogy of computer hardware and the latter on that of computer software.

Both approaches debate whether *g* is a unitary mental process rather than a composite of several independent ones. Each has developed ingenious ways to parse different mental processes (see, for example, the journal *Intelligence* and handbooks and compendia by Douglas Detterman, Robert Sternberg, Philip A. Vernon, and Benjamin Wolman). Both approaches correlate differences in people's cognitive processing (its accuracy, speed, consistency) with their IQ scores in order to determine how many and which processes might be sufficient to account for differences in *g*. Both have found processes that correlate with IQ, some quite substantially, but neither has yet been able to account fully for IQ differences, either in a statistical or causal sense.

As a result, different models of intelligence continue to flourish, but the accumulating research on mental processing increasingly constrains the plausible alternatives. The most striking constraints are these: Performance on even the simplest information-processing tasks, such as speed in responding to lights or briefly presented tones, is substantially correlated with IQ (from about .3 to .7 on a scale from 0 to 1, depending on the sets of measures involved). Although not a settled question, it appears that more than one such process is probably necessary for accounting for IQ differences, which, if true, means that *g* is not unitary (that is, it does not consist simply of speed of processing). Information processing measured in newborns and young infants (in particular, "infant habituation" to novel stimuli, which is a form of speed of apprehension measured by shifts in eye gaze) predicts their IQs later in childhood remarkably well (.7, corrected for unreliability)—meaning that some IQ-related differences emerge before socialization. Performance on more complex information-processing tasks that are designed to predict performance in different content areas (say, verbal versus spatial or numerical tasks) actually predicts about equally well across all content areas and provides additional evidence for a content-independent, general-intelligence factor that influences performance on virtually all intellectual tasks.

Other studies show biological involvement that any theory of intelligence must explain (see Arthur Jensen's 1993 summary in the *Annals of the New York Academy of Sciences*). Behavior genetic studies of

some forms of speed of information processing, for example, find that they are moderately heritable and that they share common genetic influence with *g*. Positron-emission tomography (PET) studies of the brain have found that higher IQ individuals metabolize less glucose (use less "energy") during problem solving; electroencephalogram (EEG) studies show that brain waves in response to such simple stimuli as tones are more complex in brighter individuals; and studies of nerve conduction velocity in the central nervous system demonstrate faster conduction in brighter people. Magnetic resonance imaging (MRI) studies of in vitro brain size are consistent with many studies of head circumference in producing correlations of about .3 to .4 between brain size and intelligence (controlling for body size).

Much of the experimental research was meant to dislodge *g*, but, as Brody points out, it has actually strengthened the need for such a content-independent general capacity in explaining intelligence. There is little agreement yet on the elements of *g*, but the many correlates of *g* in cognitive-processing research suggest such possibilities as speed of processing elementary information, capacity of working memory, ability to sustain attention, and ability to discriminate similar stimuli under difficult conditions (such as distraction and limited exposure). A look at the social correlates of *g*—discussed presently—provides more information about its meaning. Whatever it is, *g* is implicated in brain processes and social processes alike.

What creates differences in intelligence? The nature-nurture question has embroiled the study of intelligence in public controversy more than any other. The standard formulation of that controversy depicts individuals as passive creatures, of either their genes or their environments. This public caricature of the question of causation bears no resemblance to its scientific study and the answers gleaned thus far. Contemporary research paints quite a different picture: human beings as active agents, with the capacity both to modify and to sustain themselves and their environments—a bounded capacity to be sure, but substantial nonetheless.

The new field of behavioral genetics has revolutionized inquiry into the so-called nature-nurture question in the last two decades. Somewhat a misnomer, behavior genetics is the simultaneous study of the environmental and genetic origins of human traits. It provides a set of techniques for estimating how much of the variation among individuals in a population can be attributed to environmental variation, genetic variation, and the inseparable combination of the two. Research is far beyond arguing whether nature or nurture is more important—a question it regards as misleadingly simplistic. As described in recent scientific books (such as Robert Plomin and Gerald McClearn's *Nature, Nurture, and Psychology*) and journals (*Science*, June 17, 1994), behavior genetics is turning upside down many of our notions about both environment and heredity.

There is no doubt whatsoever that IQ differences among individuals can be traced to both genetic and environmental differences. Contrary to common perception, however, estimates of overall heritability (the squared correlation of phenotype with genotype) are not of primary interest but are only preludes to deeper analysis. Heritability estimates depend on the degrees of genetic and environmental variation in the population studied, but such variation can vary over time and place without reflecting any change in the nature of intelligence itself.

Imagine a society in which genetic variation for intelligence is moderate but unchanging over generations. Imagine also that the society evolves from one in which living conditions differ dramatically from one individual to another into a society in which all persons live in fairly equal circumstances. This is the goal of modern democracies, which seek equal opportunity through equal conditions of birth. As intimated earlier, heritabilities for intelligence will *rise* dramatically in that society as social circumstances are equalized. Its citizens may become less variable in observed intelligence, but the remaining IQ differences among them will be mostly genetic in origin. Intelligence influences socio-economic outcomes, so heritabilities will rise for the latter as well.

Genetic differences will loom large in this highly egalitarian society. Its remaining social distinctions could be eliminated only by eliminating the genetic differences or by somehow short-circuiting their influence. So far, no society has been able to do either. Such pre-school interventions as the Milwaukee Project and Head Start have failed to raise low IQs permanently. Similarly, no one has yet discovered how to equalize rates of learning from instruction or experience among individuals at different levels of the IQ continuum, despite occasional claims to the contrary.

Although of limited interest in themselves, estimates of overall heritability have been important in exposing a serious error in much social science research, which is to interpret all family effects as environmental. To illustrate, parents from higher social classes are brighter on average than parents from lower social classes, and their children are likely advantaged both genetically and environmentally. Differences between higher and lower social class children, whether in intelligence, personality, or psychopathology, therefore, cannot be attributed solely to differences in their environments. Unfortunately,

much social science research infers precisely that they can—thus substantially overestimating the environmental effects of parents and families. Behavior geneticists such as David Rowe (*The Limits of Family Influence*) argue that most research on child development is uninterpretable because it has ignored the genetic component in the family transmission of behavioral traits.

Heritabilities tell us little about the extent to which IQ might be changed through environmental means, but *shifts* in heritability can reveal a lot about the nature of environmental effects that currently influence development. Scholars and laypeople alike have long assumed that environmental effects on intelligence and personality escalate from infancy through adolescence. For example, many social interventions such as Head Start assume that early intervention is essential because environmental effects on children are enduring and cumulative.

Behavior genetics reveals the opposite. The heritability of intelligence *rises* with age, from about .4 in early childhood to about .8 in old age (on a scale from 0 to 1). About 40 percent of the variation in intelligence among younger children and 80 percent among older adults is owing to genetic differences among them (leaving 60 percent and 20 percent, respectively, to differences in their environments). Longitudinal adoption studies provide graphic evidence of this shifting balance between environmental and genetic effects during development. With increasing age, adopted children become *less* like their adoptive parents and siblings and *more* like their natural parents in intelligence.

Using sophisticated statistical modeling techniques, behavior geneticists estimate two different components of environmental influence. (Such modeling can also produce estimates of additive and non-additive genetic effects as well as of genotype-environment interactions.) The two environmental components are shared (between-family) effects and non-shared (within-family) effects. Shared effects reflect family influences that affect all siblings in the same way—parental education, say, or child-rearing styles. Non-shared effects refer to environments and experiences that siblings do not share—health history, prenatal environments, parental favoritism, different teachers and friends.

Estimates of these two environmental components are obtained by modeling the correlations among people who are characterized by different degrees of genetic and environmental similarity (for example, identical versus fraternal twins reared together or apart, adoptive versus natural parents and siblings, and so on). Many good data sets are now available for such purposes, including national registries

of twins in some countries and longitudinal inquiries such as the Colorado and Texas Adoption Studies. Together, these projects sample most of the environmental variation found in Western societies. They do not include families in extreme poverty or great wealth.

Resulting estimates of the two components of environmental influence consistently show that non-shared environments are more important than shared ones in accounting for IQ differences, no matter what age group was considered—that is, the environments that most influence IQ are the ones that relatives do not share rather than the ones they do. (*The Limits of Family Influence* describes the same results for other ability and personality traits studied so far, excluding criminality.) The effect on IQ of shared family environments drops to nil by adulthood, as illustrated by the vanishingly small correlation between the adult IQs of unrelated individuals who grew up together.

It is hard to exaggerate the implications of this well-replicated finding on shared versus non-shared effects. It obviously does not mean that environments are unimportant. We know, for instance, that duration of schooling, exposure to lead, malnutrition, and perinatal conditions together may explain several percent of the IQ variation in the U.S. And, as noted, research to date has not included extreme environments with conceivably atypical effects.

Instead, the data on shared versus non-shared influences suggest that we have greatly misunderstood the nature of environmental effects. Most environmental effects do not, as so often assumed, stem from differences among family units and their members' shared experiences. By far most families in Western society seem equal in their capacity to stimulate the development of adult intelligence. Rather, environmental effects stem mostly from differences *within* families—that is, from influences we experience as individuals, not as members of the same family.

Consider, for example, that parents do not treat their children identically, as much as some may try, and there is much randomness in children's lives with regard to friendships, teachers, and other experiences. Children with different personalities (shy versus gregarious, calm versus impulsive) and capabilities (bright versus dull, athletic versus not) tend to evoke different reactions from both family members and others. Siblings also tend to evoke different reactions, even in shared environments, because they often differ considerably from one another for genetic reasons (on average, they share only half their genes in common). Most people do not realize how widely siblings and their parents differ among themselves (by about 12 IQ points, on the average, compared to an average difference of 17

points between any two random individuals in the U.S. population).

Sandra Scarr has also described (in *Psychology, Public Policy, and Law*) how people make their own environments. Different genotypes (say, extroverts versus introverts) seek out different experiences and create different environments for themselves, especially as they become more independent from their families. She refers to this as niche finding. In short, environmental effects are a different and probably richer stew than we have imagined—and one, moreover, to which individuals may make their own contributions.

Behavior genetics also stimulates rethinking about the course of intellectual and personality development throughout the life span. Specifically, it shows how both change and continuity from one age to another may often have partly genetic roots. Nathan Brody's *Intelligence* reviews recent research on mental capabilities in childhood and their decline in later life. In summary, behavior genetics research puts the discovery of high heritabilities for intelligence in new perspective. Contrary to the canards, this finding does not mean that intelligence is fixed at birth, unchanging, or unchangeable. Genetic differences may indeed contribute to an inevitable mental hierarchy among individuals based on mental ability, but the limited genetic similarity of siblings and parents guarantees that members of the same family will tend to fall along very different points of the IQ continuum. Environmental effects may move family members up or down over time on the IQ continuum, but they apparently tend not to move members in tandem. These independent effects on family members are not entirely random, however. Instead, they probably result partly from members searching out niches more congenial to their different genotypes. People help to create their own environments.

How important are differences in intelligence? In order to determine how important they are, one must ask "for what" (education, employment, family life), "for whom" (individuals, groups, societies), and "relative to what else" (personality, social class, physical abilities).

Pertinent evidence comes from thousands of studies across many decades and disciplines. Most of the evidence derives from applied research in education, training, and employment selection, some of it experimental, and much of that from nonacademic settings (military, private sector, federal government). Other evidence derives from academic research attempting to explain social problems (crime and delinquency, family pathologies) or processes (income inequality, child development). Relatively little of this research has yet been mined to answer questions about the importance of *g* in social life, but clear patterns are already evident.

The research discloses two fundamental facts about the relation of *g* to the success and well-being of individuals. First, low intelligence seldom guarantees failure, and high intelligence never guarantees success. Rather, *g* affects the *odds* of particular outcomes. The higher the level of *g*, the more favorable the odds. Contrary to popular belief, there seems to be no threshold above which additional intelligence ceases to be useful.

The second fact is that the differences in odds associated with different IQ levels seem to widen or narrow depending on the nature of the tasks and outcomes considered. Put another way, a higher IQ is a much bigger advantage in some arenas of life than others. Such outcome-specific variations in the importance of *g* are often usefully quantified by calculating correlations with IQ. The higher an outcome correlates with *g*, the more "*g*-loaded" it is said to be (the more it calls upon *g*). Average *g* loadings are about .2 (on a scale from 0 to 1) for law-abidingness, .4 for job performance, .6 for years of education attained, and .8 for standardized academic achievement. While moderately *g*-loaded on the average, jobs differ in *g* loading depending on the nature and variety of their tasks, rising from about .2 for simple jobs to .8 for highly complex occupations. Learning some jobs is more *g* loaded than performing them once they are learned.

Detailed job analyses show that the major distinction among jobs is their dependence on *g*, and the major distinction between more and less *g*-loaded jobs is the cognitive complexity of their constituent tasks, as indicated by requirements for reasoning and making judgments, identifying and reacting to problem situations quickly, and continually learning job-related information. What these *g* loadings simultaneously imply is that "other things" matter much more than *g* for some outcomes (committing a crime, performing well in unskilled work), but much less than *g* for others (succeeding academically or in professional work).

Personnel-selection psychologists have tried in recent years to reduce the importance of *g* in hiring. Their efforts have been only minimally fruitful but have generated much data on the importance of *g* relative to other factors. Meta-analyses confirm that batteries of special aptitude tests rarely predict job performance much better than *g* alone, the latter carrying "the freight of prediction" in all but the simplest jobs (where physical capabilities are more important). Intensive experimentation with less *g*-loaded predictors, both old (personality tests) and new (biographic inventories), demonstrates that they are often useful predictors of overall performance yet seldom equal the utility of mental tests. With the exception of the personality trait of "conscientiousness," the less *g*-loaded predictors

(such as the specific aptitudes) are useful across a narrower range of jobs (say, sales but not clerical or crafts work) than is *g*. Recent efforts to map separate dimensions of job performance (among soldiers) show that *g* predicts technical proficiency (both general and specific) much better than do temperament and personality traits, though the latter tend to be the better predictors of some aspects of performance (self-discipline, professional bearing). Better training and lengthier experience can enhance job performance, but they do not equalize the performance of brighter and less bright workers.

Life can be conceptualized as a series of tasks and circumstances ranging in *g* loadedness from high to low, and adults may be able to carve out niches that limit demands for *g* and emphasize other talents. Yet virtually everything we value in social life (from health to social adjustment) seems to correlate at least a little with IQ, probably because most tasks in life involve at least a little judgment or learning.

The general implication for individuals is clear. Life is replete with more or less *g*-loaded tasks, from learning a trade and handling personal finances to reading a bus schedule and dealing with troublesome neighbors. Low-IQ individuals therefore have the odds stacked against them to some degree virtually everywhere they turn. They seem to face their greatest hurdles in getting ahead in school and occupations.

Other research has emphasized the implications of *g* for groups. It has involved two general questions: first, how does upward or downward displacement (location) of a bell curve along the IQ continuum change the proportions of high- versus low-IQ individuals in a group, and, second, does race and ethnicity change the odds of success associated with particular levels of IQ? These two factors—the proportions of individuals at each IQ level and the odds associated with those IQ levels—together determine the rates of good and bad outcomes exhibited by the groups in question.

The evidence shows that bell curves are located higher on the IQ continuum for some groups (Ashkenazi Jews and probably East Asians) but lower for others (blacks, Hispanics) when compared to the majority population. Higher proportions of individuals in the former groups fall in the ranges of IQ with highly favorable odds, while relatively more members of the latter groups fall in the high-risk ranges of IQ. All else being equal, upwardly displaced groups will have relatively high rates of the favorable outcomes associated with high *g* (graduate education, professional employment) and low rates of the negative outcomes associated with low *g* (school failure, chronic dependence on welfare). The reverse will be true for downwardly displaced groups.

The research comparing IQ bell curves also shows clearly how the displacement of curves has its biggest effects on the "tails" of a curve, meaning that a small shift of the curve up or down the IQ continuum can have dramatic effects on rates of behavior associated with very high or very low IQs. For instance, the 15-point downward displacement of the bell curve for American blacks cuts by three the proportion of blacks above the white average (about IQ 100), but it cuts by twenty the proportion available in the IQ range typical of physicians and engineers (above IQ 115) and multiplies by seven the proportion falling in the retarded range (below IQ 70). Clearly, a considerably larger proportion of blacks than whites battle against daunting odds. So too, no doubt, do their families and communities as a result.

All else besides IQ is not always equal, of course, so some research looks specifically at how odds along the IQ continuum may differ depending on race or ethnicity. Outcomes with perhaps the closest causal connections to *g* seem to show the most similar odds. For example, the evidence concerning on-the-job and standardized academic performance indicates that blacks, Hispanics, and non-Hispanic whites with the same IQs perform about equally well. However, the rates are better than expected for some groups on some outcomes and worse than expected on others, compared to whites.

The Bell Curve illustrates such deviations, some of them already well known, in its sample of young adults. Controlling for IQ and age, blacks and Hispanics were *more* likely than whites to hold a bachelor's degree and a high-IQ job. On the other hand, blacks (but not Hispanics) were less likely to be married or employed and more likely to be on welfare if poor. Controlling for IQ and age, Hispanics were somewhat more likely and blacks much more likely to have children out of wedlock, live in poverty as an adult, or be incarcerated. Thus, group disproportions in IQ seem to provide a partial—but only partial—explanation for various racial-ethnic inequalities in outcome.

Only rarely have scholars asked how societies evolve in response to their members' differences in *g*. The question is of considerable contemporary importance, however, as modern economies raise the premium on *g*. How a society attempts to change or evade the causal significance of individual and group differences in *g* can itself alter systems of education, law, politics, and economy. Such attempts at avoidance may have as far-reaching consequences on social institutions and national life as the differences in *g* they would negate. Our own nation's largely unacknowledged struggle with the democratic paradox seems a case in point.

To summarize: *g* is a general mental capability and has correspondingly general importance in social life. It is the ability to deal

with complexity in mental tests and seems to confer its greatest advantages in performing the more complex tasks in life. Other personal traits always matter, especially when complexity is only moderate to low, but higher intelligence continues to confer some advantage in the simplest mental tasks. Even a moderately low IQ does not prevent one from being a good citizen, mate, and parent, but it does make many ordinary life tasks much more difficult.

Group disparities in IQ draw particular attention in a democracy by virtue of the unsettling inequalities to which they lead. The consequences of group disparities are, however, but a special case of the democratic paradox. Moreover, they divert attention from the deeper crosscurrents created by the wide dispersion in human intelligence—dispersion that characterizes all societies but especially bedevils modern democracies.

Research on intelligence thus points up an endemic problem of modern, technological democracy. The combination of increasingly similar social conditions and increasingly technological jobs makes differences in intelligence both more important and more prominent in American life. Not surprisingly, however, critics blame the study of intelligence rather than democracy or technology. Americans seem to have an enduring faith that the solution to democratic or technological problems is simply more democracy or more technology. But while the critics, in my view, wrongly blame the messenger, they are correct in one critical respect. In an earlier age, success in life rested on a wider variety of personal characteristics, including enterprise, tenacity, and sheer physical prowess. Today, the basis of socio-economic success seems narrower and limited to a smaller segment of the population. What makes *g* so important in America today is modern, technological democracy itself.