

Intelligence and How to Get It

February 26, 2011

Richard Nisbett

It's a truism most people don't have too much trouble with, at least on the surface: Some folks are smarter than others. But patterns of intelligence-test scores and academic achievement also reveal pretty clearly that some *groups* are smarter than others, too, and that's a fact that makes socially progressive people (including many psychologists) uneasy. How do we explain group differences in intelligence? Is it nature, nurture, or some combination?

Over the years, many researchers have been persuaded that there is a sizable genetic component. *The Bell Curve*, a 1996 book on the subject by Richard J. Herrnstein and Charles Murray, made waves by arguing that intelligence is a singular, definable, measurable quantity that is highly heritable. Most controversially, the authors of that book argued that all races are not created equal when it comes to IQ.

But just from this year's APS Convention (see Presidential Symposium on page 11), it is easy to see that the notion that biology is destiny is losing ground even on one of its most securely held fronts, the field of genetics.

Richard Nisbett's "Bring the Family" address on the final evening of the Convention let loose a barrage of data and arguments to demolish *Bell Curve*-style claims that IQ has to do mainly with our genes and that group differences are an effect of differences in innate potential.

In his talk on "Intelligence and How to Get It: Why Schools and Cultures Count," Nisbett deconstructed the presumption of IQ's high heritability. To some, the most persuasive data of IQ as a matter of nature rather than nurture have been studies of identical twins reared apart. Generally, twins raised separately end up very similar in IQ and academic achievement. Based on such studies, some researchers have claimed that the heritability of IQ is as high as .8 (or 80 percent). Such a figure seems to imply that the environment, for instance the family context or schools, has only a small effect on how smart we are — a conclusion that could easily be taken to imply we shouldn't waste time and money on education, especially education of kids from supposedly intellectually disadvantaged groups, since it won't have that much impact.

But Nisbett provided a basketball analogy to illustrate how subtle environmental influences can confound the picture of heritability painted by twin studies, making small genetic variations look much more significant than they really are. "Suppose you have two identical twins, John and Joe. They're both a little bit taller than average and a little bit quicker than average. They're raised in different environments, but those environments are going to be made similar by virtue of the fact that this relatively small advantage is going to lead them to play basketball more frequently, to be chosen on teams more, for it to be more rewarding, for them to come to the attention of coaches, so they're going to be similar with respect to basketball ability. And other identical twins who may be a little shorter and

stodgier than average are going to have very similar experiences to each other, and end up not having much basketball ability. But this pattern of data will tell you that basketball ability is largely heritable.”

Richard Nisbett (left) and APS President Walter Mischel

The same is true of intelligence: “Relatively small genetic differences in intelligence can be parleyed through environmental effects which are a consequence of those very small differences,” he said. “You think very differently about heritability when you conceptualize it in that way.”

Separated at Birth but United by Class

And sometimes environment is everything, but when natural experiments like adoption can’t control for it, its effects may disappear from view. The rearing environment of adoptive families tends to be very similar to that of the biological family, Nisbett noted. Most identical twins raised apart are still raised in the same town, go to the same school, or are raised by relatives. “Adoptive families are like Tolstoy’s happy families,” he said — “they’re all alike. They tend to be upper middle class or middle class. There’s not that much difference between Doctor Jones’ family and Lawyer Smith’s family.” Such families, he said, “provide *extremely promotive* conditions for IQ.” What’s more, even when adoptive families are working class, those families tend to have home environments more like their upper-class counterparts in that they promote intellectual attainment. The similarity among adoptive parents is so great, Nisbett said, that it puts a strict limit on how high the correlations between IQ and environment can be, and thus makes IQ look like it’s all a matter of genetics when it’s really not.

“If you don’t take home any other point than this today, please take this home,” Nisbett said: “The similarities in identical twins are a function of their shared experiences.” And, he added, a simple thought experiment is enough just to establish that even very high heritability would have no implications for how *modifiable* intelligence is: “We could all take a pill which would increase IQ by a standard deviation. That would override heritability. As it happens, we *have* taken such a pill. We just don’t know its ingredients.”

Ingredients of Intelligence

Intelligence is not a single thing, despite what the authors of *The Bell Curve* tended to imply. Analytical intelligence — the kind of thing most intelligence tests are designed to measure — really consists of two completely separate components, Nisbett said, and they are each subject to different kinds of environmental and other influences.

The core of what many people mean by intelligence is *fluid intelligence*, or the ability to solve novel abstract problems on the spot. This is contrasted with *crystallized intelligence*, or knowledge of the world and how it works. These different ways of being smart are handled by different parts of the brain and are separable to such a degree that it is possible (for instance due to brain damage or conditions like autism) to rate at a completely normal level in one but be highly impaired in the other.

Fluid intelligence (along with abilities like self-regulation) is mainly a function of the brain’s prefrontal areas. The prefrontal cortex and the fluid skills it controls are affected strongly by age. “By the time you reach my age, you will have lost the better part of a standard deviation in fluid intelligence,” Nisbett said

(“But I don’t miss it,” he quipped). The prefrontal cortex is also known to be vulnerable to the effects of stress. One important mechanism by which social class affects intelligence is via the level of stress experienced by a child. There is permanent damage to the prefrontal cortex as a result of stress, Nisbett said, and lower socioeconomic-status kids have much more stress than their higher status counterparts.

Fluid intelligence is the ability measured by the widely used Raven’s Progressive Matrices, a test of abstract reasoning that has been touted as being “culture-free,” in that solving its multiple-choice problems doesn’t require culture-specific experience about the world. Such a claim is hollow, according to Nisbett, as of all the measures of intelligence, Raven’s has been the most subject to the Flynn Effect — the progressive increase in intelligence-test scores over time. You have to keep making IQ tests more difficult because people keep getting better and better at them, he explained — a change that must be due to changing environmental influences, including the fact that schools are increasingly teaching the kinds of fluid skills Raven’s Matrices is designed to examine. “Raven’s is not culture-free,” he said. “It’s *drenched* in culture.”

Whereas fluid intelligence diminishes with age, crystallized intelligence increases as we grow older and gain more life experience. This type of intelligence is also clearly subject to the Flynn Effect, for reasons that are even more obviously due to education and to the increasing availability of information in today’s society. People use more words now than they used to, for one thing. “These gains clearly do reflect genuine intelligence gains,” he said. “People with bigger vocabularies are smarter. Vocabulary is concepts, and if you’ve got more concepts, you’re smarter. And the gain for adults in vocabulary has been over a standard deviation in the last 60 years.”

Schools are clearly a big ingredient in the “pill” that is making us smarter. They are doing a better and better job of teaching people about the world and how it works, things that will stand students in good stead on tests of crystallized intelligence, Nisbett said. He noted, though, that popular culture probably also deserves a lot of the credit. Today’s TV shows display a surprisingly high level of vocabulary and plot complexity, especially when compared to the evening fare of past eras. “*I Love Lucy* was terrific,” he said, “but you weren’t going to learn much vocabulary from it.”

Class’s Toxic Effects

Yet even if everyone is getting smarter, the gap in IQ between social groups remains. The numerous stresses of low socioeconomic status are largely accountable for this. Different rates of maternal alcohol consumption, exposure to environmental toxins like lead or insecticide, and asthma between working-class and middle-class families all contribute to differences in measured intelligence. So can breastfeeding: Wealthier mothers are substantially more likely to breastfeed their infants, and “as far as we can tell, nine months of breastfeeding is worth six IQ points,” Nisbett said. Added to the other stressors of living in poorer communities, the transience commonly experienced by children of lower socioeconomic-status families is another huge obstacle to intellectual attainment. Moving is a major social stressor for kids, he said; “There are inner city schools where the average turnover from the beginning of the year to the end of the year is 100 percent.”

But a big factor in intelligence is the way parents relate to their kids. There’s a huge difference — one that, Nisbett said, “would surprise us middle-class folks” — in the likelihood of middle-class versus working-class parents talking to their kids and in the way they talk to them. Upper socioeconomic-status

parents, he said, are much more likely than working-class parents to engage children in actual conversation rather than mere pleasantries and directives. And they spend more time teaching their kids, instructing them in concepts and categorization. “The child of professional parents has heard 30 million words by the time she’s 3 years old,” Nisbett said. “The child of working-class parents has heard 20 million words.”

Professional parents also are more encouraging. By the age of three, Nisbett said, “the child of professional parents has heard six encouragements per reprimand. The child of working class parents, by the age of three, has heard two encouragements per reprimand.”

These social-class differences are “particularly toxic,” Nisbett said, for Blacks who are subject to the added effects of discrimination and stereotype threat. Blacks’ diminished expectations for social and intellectual attainment are expressed in family life. “The child of Black welfare mothers hears 10 million words by the age of three” — one third the vocabulary heard by a child of professional parents, in other words. What’s more, “the Black lower-class child has heard two reprimands per encouragement — it’s a reversal even for the ratio for working-class parents.”

Nisbett explained that, in effect, Black parents, even if they are middle class, are socializing their kids as if they were still lower class. The reason is that, just as “generals prepare for the last war” parents socialize for the occupations that their parents had. And most middle-class Blacks, even today, are first generation.”

Closing the Gap

Those who persist in arguing that there is any kind of genetic component in the Black-White IQ gap are easily refuted by a wide range of data, Nisbett said. For one thing, Blacks in this country range from mostly African in ancestry to partly or even mostly European in ancestry, yet studies have found zero correlation between the degree of European ancestry and IQ in Black populations — which would have to exist if heritage played any role in the IQ difference. Likewise, a natural experiment in which Black or mixed-race children were adopted into either Black or White middle-class homes showed that Black and mixed race children have the same average IQ at age 9, indicating that European heritage has no advantage for Black children. Equally important, the race of the adopting family makes a great deal of difference: the children raised in Black homes had IQs 13 points lower than those raised in White homes. The race of the adopting family accounted for almost all of the IQ difference found between Black and White children at the time of the study, indicating that environmental factors account for all the difference between the races.

There’s no argument to be made, therefore, that the disparities in intelligence and academic achievement can’t be reduced by changing the environment. So what works? Most early childhood education programs do little to increase intelligence in the long run, though the very best have huge effects on academic achievement and life outcomes. Vouchers and most charter schools do little to reduce the race and socioeconomic gap in achievement, Nisbett said, but highly other enriched educational environments (such as the Knowledge is Power program being tried in many schools throughout the country) are highly effective.

Social psychologists have designed a number of effective interventions that have the advantage of

costing next to nothing. Nisbett highlighted a few of them, including a project by Carol Dweck (Stanford University) to convince junior high kids that their intelligence is under their own control. “She shows them pictures of dendrites growing toward each other, and she reports that some of these tough junior high boys will actually cry when she convinces them they really do have control over how smart they are.” Another intervention by Geoffrey Cohen (University of Colorado) and colleagues, in which high-school students in an integrated school were assigned to write about their most important value, reduced the Black-White grade gap by 40 percent.

But ultimately the best way to fix the problem is to reduce the wealth disparity in this country, Nisbett said. Data from industrialized nations show clearly that “the greater the wealth gap between higher and lower classes, the greater the IQ gap and the academic achievement gap.” Obviously it’s a tall order, but measures like increasing the minimum wage would be a small step in the right direction.

“If we want the poor to be smarter,” he said simply, “we should make them richer.”