CHAPTER 7

Intelligence, Society, and Human Autonomy

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As recently as 10 years ago, a steel chain of ideas dominated the minds of those who studied and measured intelligence. Much of my own contribution has been to break its links and therefore I must describe them in some detail. Arthur Jensen was its best advocate. The enemies of truth tried to silence Jensen. Science progresses not by labeling some ideas as too wicked to be true, but by debating their truth.

The Steel Chain of Ideas

Jensen believed that intelligence is something that transcends culture, social history, and even species; a name for certain traits of a properly developed brain that allow us to solve the wide variety of cognitive problems presented in everyday life. He based his beliefs on four pillars: factor analysis, kinship studies, the dominance of *g* (the general intelligence factor), and the method of correlated vectors.

Factor Analysis

There can be an inter-correlation between several factors. For example, Wechsler IQ tests have at least 10 subtests. These measure vocabulary, general information, comprehension, arithmetic, memory, solving novel problems, how quickly you process information, and logical analysis. There is a positive manifold: people who do better than average on one subtest (say, vocabulary) tend to do better on the other subtests as well. Factor analysis calculates the size of this tendency and this is called *g* (Jensen, 1998, pp. 18–21).

You can calculate how much performance on each subtest predicts performance on the 10 collectively. This is called the *g* loading of a subtest (Jensen, 1998, pp. 24–30). Something interesting: the higher the *g* loading,

the more complex the cognitive problems the subtest poses. For example, digit span forward just tests for short-term memory: when someone reads out numbers at random, how many of them can you repeat in order? But digit span backward asks you to repeat them in reverse of the order in which they were read out. Clearly the latter has greater cognitive complexity than the former, and this is reflected in a much larger *g* loading. This encouraged some to identify *g* with intelligence. They argued that intelligent people ought to exceed the average person more the more complex the cognitive task.

The Tale of the Twins

Twin studies were interpreted as suggesting that the primary explanation of *g* lays in certain facets of the human brain, whose potential was largely determined by one's genes. Take identical twins raised apart from birth. If despite randomly separated environments (say one raised in a farm family and the other in a professional home), they grew up with identical IQs, we would know that their identical genes were all-powerful. Raising identical twins in the same home offers additional information. If there were a gap between their adult IQs, we would know that neither genes nor common environment exhausted the influences on IQ. There would be a third factor present, uncommon environment, which I will call "luck" environment. Even though the twins had the same genes and the same family environment, one girl might be dropped on her head, or in later years, the death of a child might cause deep depression.

Although family environment is a huge influence on IQ among preschoolers, genes absorb environmental influence by the late teens or early 20s. IQ differences evolve from 70 percent due to shared family environment and 10 percent due to genes toward 0 percent due to family environment and 80 percent due to genetic differences (Jensen, 1998, pp. 177–182). The 20 percent due to luck holds at every age: bad or good luck can happen at any time (Haworth et al., 2010).

Jensen believed that the weakness of environment within a race or a culture applied across all races and cultures, which left genetic differences between races and cultures dominant. He poked fun at those who think environment rather than genes must explain group differences. What would they say about the Watusi and Pygmies, the tallest and shortest subpopulations within Africa, whose average heights differ by one foot? (Jensen, 1973, pp. 135–145, 149).

Raven's and the Martians

Raven's Progressive Matrices has the highest *g* loading of any test (Jensen, 1998, pp. 37–38). Therefore, Jensen believed that it measures the kind of intelligence that allows a bright person to better the average person the more complex the task. It differs from tests of *crystallized* intelligence. They measure the mental abilities that bright people are likely to develop as they live their lives in a given society. Bright people are likely to acquire a large vocabulary, learn more of whatever they are taught in school, and better comprehend their culture's peculiar social arrangements (what mailing a letter is all about). Thanks to their content, they are culturally sensitive.

Raven's Progressive Matrices, on the other hand, is a test of *fluid* intelligence and appears culturally reduced (Jensen, 1980, pp. 645–647). It presents you with simple shapes and poses problems that assume a minimum of learned content. Jensen (1973, p. 320) believed that the members of every culture would find the symbols familiar and the tasks congenial, even Polar Eskimos. The symbols are presented in a matrices format and make logical sense in every direction (across, down, diagonally). One piece is missing. You must select the symbol that logically completes the design.

Jensen also argued that when Raven's measures *g*, it measures logical abilities that rank species. Raven's assumes a working memory that "sizes up" a problem. A chicken cannot solve the barrier problem. If it sees food through a wire fence, and the fence is long enough so that it loses sight of the food, it will not go around the fence. A dog can solve the barrier problem, but it cannot select the odd object out of three (say, hitting a triangle as different from two circles) to unlock a door. On the other hand, a monkey can solve a simple oddity problem, so its intelligence is equivalent to a human infant. Jensen said that we cannot imagine calling an extraterrestrial intelligent if it had "no *g*, or whose *g* is qualitatively rather than quantitatively different from *g* as we know it" (Jensen, 1980, pp. 178–182, 248, 251).

The Method of Correlated Vectors

Jensen used the method of correlated vectors to test whether an IQ difference between groups was a true intelligence difference. He thought *g* a better measure of intelligence than IQ; indeed at one point he suggested that thanks to *g*, we could junk the word "intelligence" entirely (Jensen, 1998, 45–49). The obvious method was to compare two hierarchies. Rank

the 10 Wechsler subtests in order of their *g* loadings; rank two groups in term of the size of the score advantage one group opens up on the other subtest by subtest; see if the two tally. If one group outscores the other more on digit span backward (high *g*) than on digit span forward (low *g*), you have the beginnings of a "*g* pattern" and the score differences are *g* differences. When you rank black versus white score differences, blacks fall behind more on those subtests that have the highest *g* loading (the greatest cognitive complexity); and these are the ones that are the most genetically influenced (Jensen, 1998, p. 322).

What if the correlation is nil? What if there is no tendency for the score differences between two groups to predict *g* loadings (say all subtest score differences are much the same)? As we will see, there have been massive IQ gains over time and these separate the generations. But however large they may be, IQ gains over time flunk the test set by the method of correlated vectors (te Nijenhuis & van der Flier, 2013). The magnitudes of the subtest gains one generation enjoys over the preceding generation have nil correlation with the *g* loadings of the subtests; and therefore, they are non-*g* gains. On these grounds Jensen (1998, p. 332) calls them "hollow." He suggests that helter-skelter gains on the subtests are simply a matter of mastering specific cognitive tasks and thus less important than *g* gains. Only the latter signal that general intelligence is progressing.

A Better Theory

I pass from describing ideas that constricted thinking about intelligence to make a case for a better theory. It is based on an analysis of massive IQ gains over time, a reassessment of the method of correlated vectors, the Dickens-Flynn model, and a refutation of genetic determination.

The Flynn Effect

Massive IQ gains over time are sometimes called the "Flynn effect." Others had shown that IQ gains occurred at a particular time and place, but I showed that it was an international phenomenon. Americans gained 14 IQ points between 1932 and 1978 (Flynn, 1984). Fourteen nations (those for whom data were available at the time) made massive gains on a wide variety of tests over as little as one generation (Flynn, 1987). Dutch males gained 20 points on Raven's between 1952 and 1982, which meant that the average Dutchman in 1982 was at the 90th percentile of his father's generation. There are now data for continental Europe, virtually all

English-speaking nations, three nations of predominately European culture (Israel, Brazil, and Argentina), three Asian nations that have adopted European technology (Japan, China, and Korea), and three developing nations just beginning to enjoy gains – rural Kenya, Dominica, and the Sudan (Flynn, 2012a).

In developed nations, gains have averaged about nine points per generation, culminating in a huge gain of 30 points over 100 years. On the face of it, this would imply that the average person in 1900 had a mean IQ of 70 and was on the border of intellectual disability. No one can seriously contend that this is so, or contend that these gains are intelligence gains in the sense of genetically improved brains. Those who were baffled by them were scholars who could not break out of a measurement paradigm to embrace a historical paradigm. Let me tell a fable.

An archeologist from the distant future excavates the ruins of America and finds a record of performances over time on measures of marksmanship. These tests show how many bullets soldiers could put in a target 100 meters away in one minute. Records from 1865 (the U.S. Civil War) show best scores of 5, records from 1898 (Spanish–American War) show 10, and records from 1918 (World War I) show 50. The gains seem far too huge to measure gains in marksmanship "genes" over 53 years. Then the archeologist discovers battlefields specific to each time. The 1865 battlefields show the presence of non-repeating rifles, the 1898 ones yield repeating rifles, and the 1918 ones yield machine guns. This explains why it was easier to get more bullets into the target over time and confirms that the score gains were not a measure of enhanced genes for marksmanship (Flynn, 2009, pp. 179–180).

We must distinguish between measuring individual differences in shooting performance at a given time and place (when everyone has the same weapons) and measuring differences between generations. If I shoot better than my contemporaries, I may be favored by genes that give me a steadier hand and better vision. If I shoot better than my father, I may be favored by the fact that social change has given me better equipment. I may have no better genes than he did (there is no real difference in genetic quality between generations), but society may have altered the whole context.

Here I wish to introduce some all-important concepts: that the brain is like a *muscle* that profits from exercise; over time, society changes in terms of *what* cognitive exercise it asks us to do; and the very stuff of our brain *alters* to allow us to meet the challenges of our time and place. These concepts apply to our physique. If we all went from swimming to weightlifting in a generation, our physical muscles would alter dramatically. If no

one drives a car in 1900 and everyone drives a car in 1950 and all cars have an automatic guidance system in 2000, the size of the hippocampus (the map-reading area of the brain) would increase and then decrease in a few generations (Maguire et al., 2000). What IQ gains over time deliver is a historical message about new demands on our cognitive abilities.

What has really changed over the past century? In the 1920s, Luria (1976) interviewed rural Russians largely untouched by modernity. He asked them to classify and to do logical inference:

> ***Fish and crows***. Question: What do a fish and a crow have in common? Answer: Nothing. A fish – it lives in water. A crow flies. If the fish just lies on top of the water, the crow could peck at it. A crow can eat a fish, but a fish can't eat a crow.
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> ***Camels and Germany***. Question: There are no camels in Germany; the city of B is in Germany; are there camels there or not? Answer: I don't know; I have never seen German cities. If B is a large city, there should be camels there. If B is a small village, there is probably no room for camels.

These examples show people three generations ago struggling with both classification (as on the Wechsler similarities subtest) and using logic in a hypothetical context, one removed from real-world problems (as on Raven's). Their minds were "handicapped" because they had on "utilitarian spectacles." The important thing for them was to manipulate the world to their advantage. This meant focusing on the differences between objects and demanding that descriptions of concrete reality be based on evidence. Why did society ask them to do these things? Ninety percent of people worked as subsistence farmers or did undemanding factory or service jobs. Few bothered with more than six years of formal schooling – they simply did not need additional cognitive skills. There were other social factors. Families tended to be large and children dominated the vocabulary level. Leisure (what there was of it) offered no intellectual challenge like video games (Flynn, 2009, pp. 23–35).

Today, people in developed nations still want to manipulate the concrete world. But they are also open to ignoring the specificity of objects in favor of classifying them using abstract categories. Take the similarities-type item: what do dogs and rabbits have in common? A schoolchild in 1900 might say, "You use dogs to hunt rabbits." She might know that "they are both mammals" – but not offer so trivial a response. The important thing is what they are used for. In 2000, schoolchildren find the correct response perfectly natural. Today they have a new habit of mind – that it

is important to classify the world in terms of abstract categories as a prerequisite to understanding it. Take Raven's-type items all of which involve using logic to perceive sequences in a series of abstract shapes. In 1900, schoolchildren found such an application of logic alien. Today, children are habituated to it.

Schooling through the 12th grade has become almost universal; and schooling eventually requires classification (the theory of evolution) and logical analysis. The very nature of schooling changed (Genovese, 2002). Exams given 14-year-olds early in the 20th century ask for socially valued knowledge: what are the capitals of the 46 states? Exams late in the century ask for general explanations: Why is the largest city of a state rarely the capital? Because rural-dominated state legislatures hated the big city and located the capital in a rural center. Today society challenges us to do cognitively demanding jobs. People whose ancestors were unskilled workers or farmers are now journalists, teachers, junior executives, and computer programmers. Are they more intelligent in the Jensen sense? Now we can be more sophisticated.

Four things happened or did not happen over the past century: (1) No genetic progress enhanced our brains at conception. Our ancestors were just as able as we are in terms of coping with the cognitive tasks their society asked them to do. (2) If our ancestors were alive today, our society would give them the mental exercise needed to cope with more schooling and modern jobs. The only reason they would get a mean IQ of 70 compared to us is that we have had the advantage of modern exercise, just as the jogging craze has produced a lot more fit people. (3) The new exercise we do would make our brains look different at death. The prefrontal lobes with which we do logical analysis would be larger; whether the hippocampus would be larger would depend on whether they had to depend on mapping and memory more than we do. (4) We probably do face a wider range of cognitively complex problems than they did and you can call us more intelligent because of that. But others would say we are better adapted to our time (Flynn, 2012a, pp. 27–28).

Note the cash value of this. Once we understand the four things that actually happened to our brains and minds over time, whether we label some or one of them "intelligence" has no independent meaning. Those who insist on using it in this context are slave to a word. They are like a person who rejects the historical paradigm for the measurement paradigm. Since IQ test compare individuals for traits much influenced by genes at a given time (eyesight, steadiness of hand), some think they must function much the same over time. Well, they do measure trait differences, of

course. Thanks to the spread of education, the average person today has a larger vocabulary than the average person in 1900. But you are not measuring a difference in the genetic potential of brains; you are measuring the effect of different cognitive exercise at two historical times.

Correlated Vectors Revisited

Recall that IQ gains over time flunk the test of correlated vectors. The sizes of the subtest gains one generation enjoys over the preceding generation have nil correlation with the *g* loadings of the subtests and are therefore non-*g* gains. The fact that they do not correlate with *g* may imply that IQ gains are not a symptom of genetically enhanced brains. That seems to me a self-evident truism. When the Dutch gained 20 points on Raven's over 30 years, who could have thought that the genetic potential of the Dutch brain in 1982 was at the 90th percentile of the potential of the Dutch brain in 1952? Dutch society was simply making people exercise the prefrontal lobes much more than in the past.

There is now a body of evidence that shows that IQ gains are historically important despite the fact that they are not *g* gains. The historical trend of IQ gains parallels and predicts the growth in GDP per capita experienced by Western nations over the past 10 decades: the correlation = 0.930 (Woodley, 2012b). Education in particular cultivates specialized patterns of cognitive abilities and these improve independently of whether they correlate with *g* (Woodley, 2012a). Ireland enhanced education, its test scores rose, and its per capita gross domestic product rose above that of England *in that order*. Finland enhanced the education of its poorest students and duplicated Ireland's trend (Nisbett, 2015). The cognitive skills measured by the SAT predict university grades even after *g* has been removed (Coyle & Pillow, 2008).

A final nail in the coffin: those who suffer from iodine deficiency, prenatal cocaine exposure, fetal alcohol syndrome, and traumatic brain injury were compared with typical subjects on the Wechsler. The typical subjects were higher on every subtest. However, the magnitude of their advantages by subtest had zero correlation with the size of the subtest *g* loadings. It is difficult to deny that the typical subjects had a significant cognitive advantage over the four comparison groups. In sum, helter-skelter or piecemeal advantages on IQ subtests are causally potent, whether between generations or between individuals (Flynn, te Nijenhuis, & Metzen, 2014).

There is an irony here: Jensen was at pains to show that IQ gains were not *g* gains. How fortunate he succeeded. If they were, we might be

confused about why they are so potent. They have been potent enough to take us from the society of 1900 to the society of 2000, and that is good enough for me.

There is also evidence that the fact that a group flunks the test of correlated vectors does not mean its members are genetically deficient. Recall that when American blacks are compared to American whites on the 10 Wechsler subtests, their performance falls further behind whites the greater the *g* loading (complexity) of the subtest. After World War II, the occupation army of American blacks and whites in Germany left behind children, all of whom were reared by their white German mothers. When they became old enough, samples of both the half-black and all-white children were compared on Wechsler subtests. The tendency for blacks to fall behind as the *g* loading increased had completely disappeared, suggesting that blacks show this tendency only when raised in the environment of the black American subculture, which was of course absent in Germany (Flynn, 2008, pp. 88–91).

Elsie Moore (1986) showed that you could not measure the effects of black subculture as Jensen did. Jensen compared black and white Americans as we would compare whites to one another: match them for SES (socioeconomic status: the years of education and profession of the children's parents). She studied 46 black adoptees, half raised by white parents of high SES and half raised by black parents of equal SES. The blacks reared by the whites had an advantage of 13.5 IQ points by age 8.5. Maternal attitudes toward the children's problem-solving attempts were overwhelmingly positive among white mothers and negative among black mothers (e.g., "let's try this" vs. "you're not that dumb"). It is significant that black Americans gained 5.5 IQ points on whites between 1972 and 2002, about one-third of the IQ gap that used to separate them (Dickens & Flynn, 2006).

The Dickens-Flynn Model

The Dickens-Flynn model attests to Bill Dickens's inspiration and skill at modeling (Dickens & Flynn 2001a, 2001b). Let us go back to the twin studies. These supposedly showed that at maturity, genes largely determined individual difference in IQ, and that environment was weak. I have already suggested that the twin studies cannot bridge cultures. The difference between U.S. white culture and U.S. black subculture could dictate different IQs for two children with identical genetic quality (much less for two children raised in America and Syria, respectively). But let us consider

the significance of twin studies even where they do work. Within the normal range of environments of white America, do they really show, even within that context, that environment disappears with age? The model lays bare the sociology behind these "facts" by using basketball as an example.

Two identical twins are separated at birth in the basketball-mad state of Indiana. Thanks to their identical genes, they will both be taller than average and have a faster reflex arc. Therefore, both will progressively access environments whose quality matches their genetic quality. Despite seemingly random environments, both will get picked more often to play basketball informally. Both will be likely to be chosen by their school to play on the school team, both will be more likely to play high school basketball and get really professional coaching.

In effect, the genetic identity between the twins tends to be a more and more powerful predictor of their basketball performance and the role of environment as a predictor fades. But even so, environment has not disappeared. It is as if two horses were pulling a chariot. During childhood, they tend to pull in different directions. But by adulthood, quality of genes and quality of environment tend to match. The two horses now pull in the same direction because the environment horse has been taught to follow the lead of the gene horse. The environment has as much *causal* potency as ever: it is simply hiding behind a mask. It is concealed by the fact that it adds little independent *predictive* potency to genes.

Let us shift from basketball to cognitive ability. Here again the context is the range of genes and environments available within the dominant culture of white America. As separated identical twins go through school, assuming higher-quality genes than average, they are both more likely to respond better to their math teachers, be given extra work, join the math club, take more advanced math courses, and so forth. But does it make any sense to say that environment is diminishing when it is simply a matter that both horses are beginning to pull the chariot together?

This phenomenon holds even at the top of the curve. My son is now a professor of pure mathematics at Oxford. At seven, he came to me with questions about infinity. He said: there are an infinite number of numbers; but there are an infinite number of even numbers; so one kind of infinity has twice as many members as another. I pointed out that this means you can do arithmetic with kinds of infinity. Subtract the infinity of even numbers from the infinity of all numbers, and you get the infinity of odd numbers. In other words, I (plus his teachers) recognized his genetic promise and tried to make sure that his quality of genes began to match an environment of similar quality. But we were essential causal factors. Imagine his

teachers and I eliminated his environment by jumping out of a window. True, as we began to make sure his genes and environment pulled in the same direction, we made his genes a better and better predictor of his cognitive skill. This reduced the potency of environment as an independent predictor, but it did not eliminate the causal potency of environment. The causal potency of environment *never* disappears.

How do we know that environment is always potent? At least when environmental changes are favorable, it can cause the Flynn effect. Between generations, there are no significant genetic differences available to correlate with (and thereby mask) the impact of cognitive evolution, smaller families, more schooling, more demanding jobs, and better health in old age. These environmental factors upgrade the *average* IQ, although in each generation different people profit from them to different degrees as always. The enormous size of IQ gains over time shows how much environmental potency was still there, hiding behind the mask of the gene–environment correlation that exists at a given time and place.

Genes and Human Autonomy

Many who read this would be from middle-class America, Britain, the Netherlands, etc. Perhaps you will now have a less condescending attitude to preindustrial societies and alienated groups that have a lower mean IQ than your own. Even if the IQ difference is large (30 or more points), nothing about factor analysis or twins shows that environment is intrinsically weak. That environment has the potential to explain a group difference of this size does not, of course, show that genes lack that potential. Whether black–white ability differences are more like height differences or cognitive exercise differences (my own view) has to be debated on its merits – stripped of any presupposition that environment *must* lose (Flynn, 1980; 2008, chs. 2–4; 2012a, pp. 132–141; Rushton & Jensen, 2010).

I doubt many of you will take a time machine to a different generation or want to move to a less privileged culture. Therefore, you may feel intimidated by genetic determination: your genes (with help) determine your current environment and thus determine your cognitive abilities. Therefore, I want to emphasize that even within a generation, when you are competing with your own age cohort, the correlation between quality of genes and quality of environment never becomes perfect. Within America and other advanced nations, there is that 20 percent of IQ variance that is ascribed to luck, chance events like being drafted or losing your job, events that plunge you into a current environment that does not

match your genetic potential (it must be even larger in less stable and more risk-prone societies).

Now reflect: At least half of the time, you make your own luck by an exercise of human autonomy. In a fit of patriotism, you may leave your job as a computer programmer to join the army; you may be disgusted with a humdrum job and decide to go back to university to immerse yourself into a more challenging environment (we hope). There is no way of interpreting the existence of that 20 percent except to assume that a lot of people are "unlucky" enough to be in an environment below their genetic capacity and could move up, and that a lot of people are in an environment above their genetic capacity that they created by welcoming cognitive challenge more than most of us. Your exercise of autonomy can leapfrog you over four-fifths of those presently above you on a cognitive ladder (Flynn, 2016, pp. 22–29).

Sociological Spectacles

The Flynn effect and the Dickens-Flynn model brought a change in mood. It became more respectable to pose environmental hypotheses and appeal to cultural differences.

That university women have a mean IQ two or three points below men was taken as evidence of female inferiority. This ignores the difference between the female and male school subculture. A girl with an IQ of 100 tends to get A's and B's and goes on to university, while a boy with an IQ of 100 tends to get B's and C's. Therefore, the upper 50 percent of women may be at your university and only the upper 40 percent of men (those with an IQ of 104 and above). That university women have a lower average IQ says nothing about the genders in general (Flynn, 2012a, pp. 141–157).

Some mental health questionnaires assume that women with a negative attitude toward marriage are more likely to be psychotic. Black women in America are more likely to have a negative attitude, but why is that? Black males suffer from premature death, imprisonment, drug addiction, AIDS, unemployment, and simply going missing. Thus, for every 100 black women of marriageable age, there are only 57 black men who are viable partners. The fact that any black woman is optimistic is symptomatic of romanticism (Flynn, 2008, ch. 2).

There is the ice ages thesis. The fact that the ancestors of the Chinese were trapped north of the Himalayas during the last ice age is supposed to show that they were rigorously selected for intelligence to cope with that harsh environment. A genetic analysis of Chinese society reveals that only those settled in the north were ever north of the Himalayas, and that

the south Chinese reached China by a coastal route through India and Southeast Asia. Yet the mean IQ of the south is equivalent to the mean IQ of the north. If the Chinese have superior genes for intelligence, the ice ages have nothing to do with it (Flynn, 2012a, pp. 33–36).

Philosophy and Science

Social scientists should learn some philosophy. Jensen (1972, p. 76) once defined "intelligence" as what IQ tests measure. Philosophy calls this "instrumentalism": thinking you can define something by reference to the instrument that measures it. If the early developers of thermometers had defined "heat" as what their thermometers measured, they by definition could never have invented a better thermometer.

Psychologists waste time trying to add precision to their definitions of "intelligence." Actually a rough definition will do: a person is more intelligent if he or she can better solve the cognitive problems his society poses as most important – assuming of course that all have an equal opportunity to access that society and are not segregated by either culture (Kalahari Bushmen) or subculture (many black Americans). Precision is needed when you begin to measure a working cognitive skill (like vocabulary). The concept of *g* was appealing because Raven's could measure it so precisely. But as the history of the 20th century showed, it was just another learned cognitive skill. (Remember Luria's subjects who could not do logical analysis of general concepts and would not take the hypothetical seriously.)

Awareness of moral philosophy reveals a dividend of IQ gains over time – cognitive progress has encouraged moral progress (Flynn, 2013, pp. 72–74). All moral debate begins with taking the hypothetical seriously: "What if your skin turned black?" A literal response ends the argument: "That is crazy – who do you know whose skin has ever turned black?" Better political debate means rejection of the anecdotal in favor of generalized evidence: congressmen in 1918 were quite capable of saying, "my wife says she does not want to vote and that is good enough for me." None of this means that young people today are more likely to be honest, brave, or altruistic. But the way in which their thinking differs from their ancestors means that fewer of them are prey to primitive racism and sexism.

The Future

Better mapping of the brain may predict which child will do better than another on Wechsler tests – by producing images of neurons, connections

between neurons, and the "spray" from dopaminergic neurons that thickens neural connections with use. If so, we will have the physiology that underlies intelligent problem solving. However, other levels of knowledge would still be relevant. Brain physiology cannot duplicate history's insights into the habits of mind acquired in the 20th century. It cannot replace the sociology of how these transformed school, work, leisure, and moral debate. I hope that research into brain physiology will be accompanied by greater sociological and philosophical sophistication.

As for IQ gains over time, after 1995, Scandinavian 18-year-olds began to perform worse on mental tests. In the Netherlands, families seem to be offering a static cognitive environment for preschoolers, high schools may be in mild decline, jobs are still cognitively demanding, and the aged profit from better health and more exercise (Flynn, in press). The worrying things are social trends contrary to those of the 20th century. Solo parenthood may be reducing the ratio of adults to children in the home, students may be more alienated from school culture, and industrial progress is beginning to create more undemanding service work rather than professional jobs.

These trends do not destroy individual autonomy. Just as a runner may follow a training schedule no matter what others do, nothing forbids you from creating a gymnasium of the mind that gives your brain cognitive exercise throughout life. You can develop the habit of reading widely, thinking critically, and seeking the truth in all things. I have tried to give you a guide in my book, *How to improve your mind* (Flynn, 2012b).

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