

# What Science Says About Race and Genetics

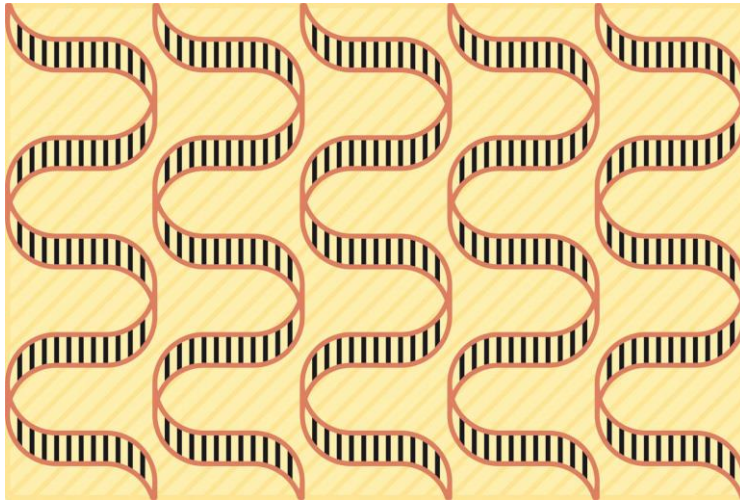


Illustration by Umberto Mischi for TIME

**The New York Times' former science editor on research showing that evolution didn't stop when human history began.**

A longstanding orthodoxy among social scientists holds that human races are a social construct and have no biological basis. A related assumption is that human evolution

halted in the distant past, so long ago that evolutionary explanations need never be considered by historians or economists.

In the decade since the decoding of the human genome, a growing wealth of data has made clear that these two positions, never at all likely to begin with, are simply incorrect. There is indeed a biological basis for race. And it is now beyond doubt that human evolution is a continuous process that has proceeded vigorously within the last 30,000 years and almost certainly — though very recent evolution is hard to measure — throughout the historical period and up until the present day.

New analyses of the human genome have established that human evolution has been recent, copious, and regional. Biologists scanning the genome for evidence of natural selection have detected signals of many genes that have been favored by natural selection in the recent evolutionary past. No less than 14% of the human genome, according to one estimate, has changed under this recent evolutionary pressure.

Analysis of genomes from around the world establishes that there is a biological basis for race, despite the official statements to the contrary of leading social science organizations. An illustration of the point is the fact that with mixed race populations, such as African Americans, geneticists can now track along an individual's genome, and assign each segment to an African or European ancestor, an exercise that would be impossible if race did not have some basis in biological reality.

Racism and discrimination are wrong as a matter of principle, not of science. That said, it is hard to see anything in the new understanding of race that gives ammunition to racists. The reverse is the case. Exploration of the genome has shown that all humans, whatever their race, share the same set of genes. Each gene exists in a variety of alternative forms known as alleles, so one might suppose that races have distinguishing alleles, but even this is not the case. A few alleles have highly skewed distributions but these do not suffice to explain the difference between races. The difference between races seems to rest on the subtle matter of relative allele frequencies. The overwhelming verdict of the genome is to declare the basic unity of humankind.

## Genetics and Social Behavior

Human evolution has not only been recent and extensive, it has also been regional. The period of 30,000 to 5,000 years ago, from which signals of recent natural selection can be detected, occurred after the splitting of the three major races, so represents selection that has occurred largely independently within each race. The three principal races are Africans (those who live

south of the Sahara), East Asians (Chinese, Japanese, and Koreans), and Caucasians (Europeans and the peoples of the Near East and the Indian subcontinent). In each of these races, a different set of genes has been changed by natural selection. This is just what would be expected for populations that had to adapt to different challenges on each continent. The genes specially affected by natural selection control not only expected traits like skin color and nutritional metabolism, but also some aspects of brain function. Though the role of these selected brain genes is not yet understood, the obvious truth is that genes affecting the brain are just as much subject to natural selection as any other category of gene.

What might be the role of these brain genes favored by natural selection? Edward O. Wilson was pilloried for saying in his 1975 book *Sociobiology* that humans have many social instincts. But subsequent research has confirmed the idea that we are inherently sociable. From our earliest years we want to belong to a group, conform to its rules and punish those who violate them. Later, our instincts prompt us to make moral judgments and to defend our group, even at the sacrifice of one's own life.

Anything that has a genetic basis, such as these social instincts, can be varied by natural selection. The power of modifying social instincts is most visible in the case of ants, the organisms that, along with humans, occupy the two pinnacles of social behavior. Sociality is rare in nature because to make a society work individuals must moderate their powerful selfish instincts and become at least partly altruistic. But once a social species has come into being, it can rapidly exploit and occupy new niches just by making minor adjustments in social behavior. Thus both ants and humans have conquered the world, though fortunately at different scales.

Conventionally, these social differences are attributed solely to culture. But if that's so, why is it apparently so hard for tribal societies like Iraq or Afghanistan to change their culture and operate like modern states? The explanation could be that tribal behavior has a genetic basis. It's already known that a genetic system, based on the hormone oxytocin, seems to modulate the degree of in-group trust, and this is one way that natural selection could ratchet the degree of tribal behavior up or down.

Human social structures change so slowly and with such difficulty as to suggest an evolutionary influence at work. Modern humans lived for 185,000 years as hunters and gatherers before settling down in fixed communities. Putting a roof over one's head and being able to own more than one could carry might seem an obvious move. The fact that it took so long suggests that a genetic change in human social behavior was required and took many generations to evolve. Tribalism seems to be the default mode of human political organization. It can be highly effective: The world's largest land empire, that of the Mongols, was a tribal organization. But tribalism is hard to abandon, again suggesting that an evolutionary change may be required.

The various races have evolved along substantially parallel paths, but because they have done so independently, it's not surprising that they have made these two pivotal transitions in social structure at somewhat different times. Caucasians were the first to establish settled communities, some 15,000 years ago, followed by East Asians and Africans. China, which developed the first modern state, shed tribalism two millennia ago, Europe did so only a thousand years ago, and populations in the Middle East and Africa are in the throes of the process. Two case studies, one from the Industrial Revolution and the other from the cognitive achievements of Jews, provide further evidence of evolution's hand in shaping human social behavior within the recent past.

### **The Behavioral Makeover Behind the Industrial Revolution**

The essence of the Industrial Revolution was a quantum leap in society's productivity. Until then, almost everyone but the nobility lived a notch or two above starvation. This subsistence-

level existence was a characteristic of agrarian economies, probably from the time that agriculture was first invented.

The reason for the economic stagnation was not lack of inventiveness: England of 1700 possessed sailing ships, firearms, printing presses, and whole suites of technologies undreamed of by hunter gatherers. But these technologies did not translate into better living standards for the average person. The reason was a Catch-22 of agrarian economies, called the Malthusian trap, after the Rev. Thomas Malthus. In his 1798 *Essay on the Principle of Population*, Malthus observed that each time productivity improved and food became more plentiful, more infants survived to maturity, and the extra mouths ate up the surplus. Within a generation, everyone was back to living just above starvation level.

Malthus, strangely enough, wrote his essay at the very moment when England, shortly followed by other European countries, was about to escape from the Malthusian trap. The escape consisted of such a substantial increase in production efficiency that extra workers enhanced incomes instead of constraining them.

This development, known as the Industrial Revolution, is the salient event in economic history, yet economic historians say they have reached no agreement on how to account for it. "Much of modern social science originated in efforts by late nineteenth and twentieth century Europeans to understand what made the economic development path of western Europe unique; yet these efforts have yielded no consensus," writes the historian Kenneth Pomeranz. Some experts argue that demography was the real driver: Europeans escaped the Malthusian trap by restraining fertility through methods such as late marriage. Others cite institutional changes, such as the beginnings of modern English democracy, secure property rights, the development of competitive markets, or patents that stimulated invention. Yet others point to the growth of knowledge starting from the Enlightenment of the 17th and 18th century or the easy availability of capital.

This plethora of explanations and the fact that none of them is satisfying to all experts point strongly to the need for an entirely new category of explanation. The economic historian Gregory Clark has provided one by daring to look at a plausible yet unexamined possibility: that productivity increased because the nature of the people had changed.

Clark's proposal is a challenge to conventional thinking because economists tend to treat people everywhere as identical, interchangeable units. A few economists have recognized the implausibility of this position and have begun to ask if the nature of the humble human units that produce and consume all of an economy's goods and services might possibly have some bearing on its performance. They have discussed human quality, but by this they usually mean just education and training. Others have suggested that culture might explain why some economies perform very differently from others, but without specifying what aspects of culture they have in mind. None has dared say that culture might include an evolutionary change in behavior — but neither do they explicitly exclude this possibility.

To appreciate the background of Clark's idea, one has to return to Malthus. Malthus's essay had a profound effect on Charles Darwin. It was from Malthus that Darwin derived the principle of natural selection, the central mechanism in his theory of evolution. If people were struggling on the edge of starvation, competing to survive, then the slightest advantage would be decisive, Darwin realized, and the owner would bequeath that advantage to his children. These children and their offspring would thrive while others perished.

"In October 1838, that is, fifteen months after I had begun my systematic inquiry," Darwin wrote in his autobiography, "I happened to read for amusement Malthus on Population, and being well prepared to appreciate the struggle for existence which everywhere goes on from long-continued observation of the habits of animals and plants, it at once struck me that under these

circumstances favorable variations would tend to be preserved, and unfavorable ones to be destroyed. The results of this would be the formation of a new species. Here then I had at last got a theory by which to work.”

Given the correctness of Darwin’s theory, there is no reason to doubt that natural selection was working on the very English population that provided the evidence for it. The question is that of just what traits were being selected for.

### **The Four Key Traits**

Clark has documented four behaviors that steadily changed in the English population between 1200 and 1800, as well as a highly plausible mechanism of change. The four behaviors are those of interpersonal violence, literacy, the propensity to save, and the propensity to work.

Homicide rates for males, for instance, declined from 0.3 per thousand in 1200 to 0.1 in 1600 and to about a tenth of this in 1800. Even from the beginning of this period, the level of personal violence was well below that of modern hunter-gatherer societies. Rates of 15 murders per thousand men have been recorded for the Aché people of Paraguay.

Work hours steadily increased throughout the period, and interest rates fell. When inflation and risk are subtracted, an interest rate reflects the compensation that a person will demand to postpone immediate gratification by postponing consumption of a good from now until a future date. Economists call this attitude time preference, and psychologists call it delayed gratification. Children, who are generally not so good at delaying gratification, are said to have a high time preference. In his celebrated marshmallow test, the psychologist Walter Mischel tested young children as to their preference for receiving one marshmallow now or two in fifteen minutes. This simple decision turned out to have far-reaching consequences: Those able to hold out for the larger reward had higher SAT scores and social competence in later life. Children have a very high time preference, which falls as they grow older and develop more self-control. American six-year-olds, for instance, have a time preference of about 3% per day, or 150% per month; this is the extra reward they must be offered to delay instant gratification. Time preferences are also high among hunter-gatherers.

Interest rates, which reflect a society’s time preferences, have been very high — about 10% — from the earliest historical times and for all societies before 1400 AD for which there is data. Interest rates then entered a period of steady decline, reaching about 3% by 1850. Because inflation and other pressures on interest rates were largely absent, Clark argues, the falling interest rates indicate that people were becoming less impulsive, more patient, and more willing to save.

These behavioral changes in the English population between 1200 and 1800 were of pivotal economic importance. They gradually transformed a violent and undisciplined peasant population into an efficient and productive workforce. Turning up punctually for work every day and enduring eight hours or more of repetitive labor is far from being a natural human behavior. Hunter-gatherers do not willingly embrace such occupations, but agrarian societies from their beginning demanded the discipline to labor in the fields and to plant and harvest at the correct times. Disciplined behaviors were probably evolving gradually within the agrarian English population for many centuries before 1200, the point at which they can be documented.

Clark has uncovered a genetic mechanism through which the Malthusian economy may have wrought these changes on the English population: The rich had more surviving children than did the poor. From a study of wills made between 1585 and 1638, he finds that will makers with £9 or less to leave their heirs had, on average, just under two children. The number of heirs rose steadily with assets, such that men with more than £1,000 in their gift, who formed the wealthiest asset class, left just over four children.

The English population was fairly stable in size from 1200 to 1760, meaning that if the rich were having more children than the poor, most children of the rich had to sink in the social scale, given that there were too many of them to remain in the upper class.

Their social descent had the far-reaching genetic consequence that they carried with them inheritance for the same behaviors that had made their parents rich. The values of the upper middle class — nonviolence, literacy, thrift, and patience — were thus infused into lower economic classes and throughout society. Generation after generation, they gradually became the values of the society as a whole. This explains the steady decrease in violence and increase in literacy that Clark has documented for the English population. Moreover, the behaviors emerged gradually over several centuries, a time course more typical of an evolutionary change than a cultural change.

In a broader sense, these changes in behavior were just some of many that occurred as the English population adapted to a market economy. Markets required prices and symbols and rewarded literacy, numeracy, and those who could think in symbolic ways. “The characteristics of the population were changing through Darwinian selection,” Clark writes. “England found itself in the vanguard because of its long, peaceful history stretching back to at least 1200 and probably long before. Middle-class culture spread throughout the society through biological mechanisms.”

Economic historians tend to see the Industrial Revolution as a relatively sudden event and their task as being to uncover the historical conditions that precipitated this immense transformation of economic life. But profound events are likely to have profound causes. The Industrial Revolution was caused not by events of the previous century but by changes in human economic behavior that had been slowly evolving in agrarian societies for the previous 10,000 years.

This of course explains why the practices of the Industrial Revolution were adopted so easily by other European countries, the United States, and East Asia, all of whose populations had been living in agrarian economies and evolving for thousands of years under the same harsh constraints of the Malthusian regime. No single resource or institutional change — the usual suspects in most theories of the Industrial Revolution — is likely to have become effective in all these countries around 1760, and indeed none did.

That leaves the questions of why the Industrial Revolution was perceived as sudden and why it emerged first in England instead of in any of the many other countries where conditions were ripe. Clark’s answer to both these questions lies in the sudden growth spurt in the English population, which tripled between 1770 and 1860. It was this alarming expansion that led Malthus to write his foreboding essay on population. But contrary to Malthus’s gloomy prediction of a population crash induced by vice and famine, which would have been true at any earlier stage of history, incomes on this occasion rose, heralding the first escape of an economy from the Malthusian trap. English workmen contributed to this spurt, Clark dryly notes, as much by their labors in the bedroom as on the factory floor.

Clark’s data provide substantial evidence that the English population responded genetically to the harsh stresses of a Malthusian regime and that the shifts in its social behavior from 1200 to 1800 were shaped by natural selection. The burden of proof is surely shifted to those who might wish to assert that the English population was miraculously exempt from the very forces of natural selection whose existence it had suggested to Darwin.

### **Explaining Ashkenazi IQ**

A second instance of very recent human evolution may well be in evidence in European Jews, particularly the Ashkenazim of northern and central Europe. In proportion to their population, Jews have made outsize contributions to Western civilization. A simple metric is that of Nobel

prizes: Though Jews constitute only 0.2% of the world's population, they won 14% of Nobel prizes in the first half of the 20th century, 29% in the second and so far 32% in the present century. There is something here that requires explanation. If Jewish success were purely cultural, such as hectoring mothers or a zeal for education, others should have been able to do as well by copying such cultural practices. It's therefore reasonable to ask if genetic pressures in Jews' special history may have enhanced their cognitive skills.

Just such a pressure is described by two economic historians, Maristella Botticini and Zvi Eckstein, in their book "The Chosen Few." In 63 or 65 AD, the high priest Joshua ben Gamla decreed that every Jewish father should send his sons to school so that they could read and understand Jewish law. Jews at that time earned their living mostly by farming, as did everyone else, and education was both expensive and of little practical use. Many Jews abandoned Judaism for the new and less rigorous Jewish sect now known as Christianity.

Botticini and Eckstein say nothing about genetics but evidently, if generation after generation the Jews less able to acquire literacy became Christians, literacy and related abilities would on average be enhanced among those who remained Jews.

As commerce started to pick up in medieval Europe, Jews as a community turned out to be ideally suited for the role of becoming Europe's traders and money-lenders. In a world where most people were illiterate, Jews could read contracts, keep accounts, appraise collateral, and do business arithmetic. They formed a natural trading network through their co-religionists in other cities, and they had rabbinical courts to settle disputes. Jews moved into money-lending not because they were forced to do so, as some accounts suggest, but because they chose the profession, Botticini and Eckstein say. It was risky but highly profitable. The more able Jews thrived and, just as in the rest of the pre-19th century world, the richer were able to support more surviving children.

As Jews adapted to a cognitively demanding niche, their abilities increased to the point that the average IQ of Ashkenazi Jews is, at 110 to 115, the highest of any known ethnic group. The population geneticists Henry Harpending and Gregory Cochran have calculated that, assuming a high heritability of intelligence, Ashkenazi IQ could have risen by 15 points in just 500 years. Ashkenazi Jews first appear in Europe around 900 AD, and Jewish cognitive skills may have been increasing well before then.

The emergence of high cognitive ability among the Ashkenazim, if genetically based, is of interest both in itself and as an instance of natural selection shaping a population within the very recent past.

### **The Adaptive Response to Different Societies**

The hand of evolution seems visible in the major transitions in human social structure and in the two case studies described above. This is of course a hypothesis; proof awaits detection of the genes in question. If significant evolutionary changes can occur so recently in history, other major historical events may have evolutionary components. One candidate is the rise of the West, which was prompted by a remarkable expansion of European societies, both in knowledge and geographical sway, while the two other major powers of the medieval world, China and the house of Islam, ascendant until around 1500 AD, were rapidly overtaken.

In his book *The Wealth and Poverty of Nations*, the economic historian David Landes examines every possible factor for explaining the rise of the West and the stagnation of China and concludes, in essence, that the answer lies in the nature of the people. Landes attributes the decisive factor to culture, but describes culture in such a way as to imply race.

“If we learn anything from the history of economic development, it is that culture makes all the difference,” he writes. “Witness the enterprise of expatriate minorities — the Chinese in East and Southeast Asia, Indians in East Africa, Lebanese in West Africa, Jews and Calvinists throughout much of Europe, and on and on. Yet culture, in the sense of the inner values and attitudes that guide a population, frightens scholars. It has a sulfuric odor of race and inheritance, an air of immutability.”

Sulfuric odor or not, the culture of each race is what Landes suggests has made the difference in economic development. The data gathered by Clark on declining rates of violence and increasing rates of literacy from 1200 to 1800 provide some evidence for a genetic component to culture and social institutions.

Though equivalent data does not exist for the Chinese population, China’s society has been distinctive for at least 2,000 years and intense pressures on survival would have adapted the Chinese to their society just as Europeans became adapted to theirs.

Do Chinese carry genes for conformism and authoritarian rule? May Europeans have alleles that favor open societies and the rule of law? Obviously this is unlikely to be the case. But there is almost certainly a genetic component to the propensity for following society’s rules and punishing those who violate them. If Europeans were slightly less inclined to punish violators and Chinese slightly more so, that could explain why European societies are more tolerant of dissenters and innovators, and Chinese societies less so. Because the genes that govern rule following and punishment of violators have not yet been identified, it is not yet known if these do in fact vary in European and Chinese populations in the way suggested. Nature has many dials to twist in setting the intensities of the various human social behaviors and many different ways of arriving at the same solution.

For most of recorded history, Chinese civilization has been pre-eminent and it’s reasonable to assume that the excellence of Chinese institutions rests on a mix of culture and inherited social behavior.

The rise of the West, too, is unlikely to have been just some cultural accident. As European populations became adapted to the geographic and military conditions of their particular ecological habitat, they produced societies that have turned out to be more innovative and productive than others, at least under present circumstances.

That does not of course mean that Europeans are superior to others — a meaningless term in any case from the evolutionary perspective — any more than Chinese were superior to others during their heyday. China’s more authoritarian society may once again prove more successful, particularly in the wake of some severe environmental stress.

Civilizations may rise and fall but evolution never ceases, which is why genetics may play some role alongside the mighty force of culture in shaping the nature of human societies. History and evolution are not separate processes, with human evolution grinding to a halt some decent interval before history begins. The more that we are able to peer into the human genome, the more it seems that the two processes are delicately intertwined.

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