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[Blog, Opinion](#)

How Science and Genetics are Reshaping the Race Debate of the 21st Century

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<http://sitn.hms.harvard.edu/flash/2017/science-genetics-reshaping-race-debate-21st-century/>

Donald Trump's election as the [45th President of the United States](#) has been marked by the [brewing storms of racial conflicts](#). [A rise in racial incidents](#) ensued in the immediate aftermath of Trump's victory in November 2016. Since the beginning of 2017, [over 100 bomb threats](#) have been made against Jewish community centers and schools. Trump's [travel ban](#), signed in late January 2017, initially [affected about 90,000](#) people from seven Middle Eastern countries; 87,000 of those banned were Muslims. Minorities such as [American Muslims](#) and [black Americans](#) have expressed fears over racial relations under Trump. Undeniably, the topic of race—and racism—has gripped America and the world throughout.

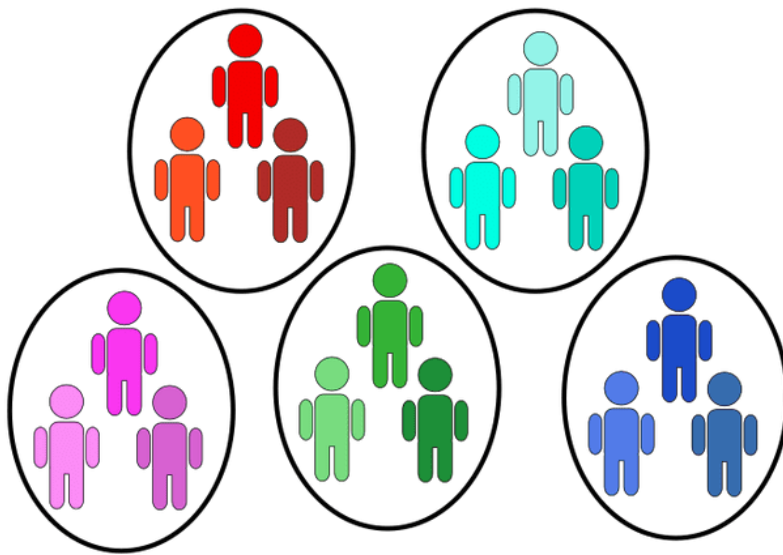
Over the last decade, there have been hopes that the US has become [a post-racial society, free of racial prejudice and discrimination](#). However, the most recent months indicate [the contrary](#): race remains an incendiary issue. Race and racism are [not new issues](#), but in today's 21st century Trump-era, discussions about race are distinct from those of the past in that they possess an entirely new dimension: that of genetics and DNA.

Race in the new era of human genetics research

In 2003, scientists completed the [Human Genome Project](#), making it finally possible to examine human ancestry with genetics. Scientists have since tackled topics such as human migrations [out of Africa and around the world](#). And it's not just scientists who are excited about human genetics: widely affordable at-home ancestry test kits are now readily available from companies like [23andMe](#), [Family Tree DNA](#), and [Ancestry](#). For \$99—around the price of a romantic dinner or a pair of Nikes—a customer can receive an analysis from 23andMe indicating that they are, for instance, 18.0% Native American, 65.1% European and 6.2% African.

The soaring popularity of ancestry testing bespeaks a widespread perception that we can use these tests to dissect, delineate, and define our ancestral composition. Indeed, social media is teeming with blog posts, [and even livestream videos](#), from excited customers bursting to broadcast their test results and their reactions. Ancestry test kits are the new “it” item—and with their success is the tacit admission of our belief that our DNA can sort us into categories like the “[five races](#),” African, European, Asian, Oceania, and Native American (Figure 1A).

A) Popular conception of genetics and "5 races"



B) Actual genetic variation

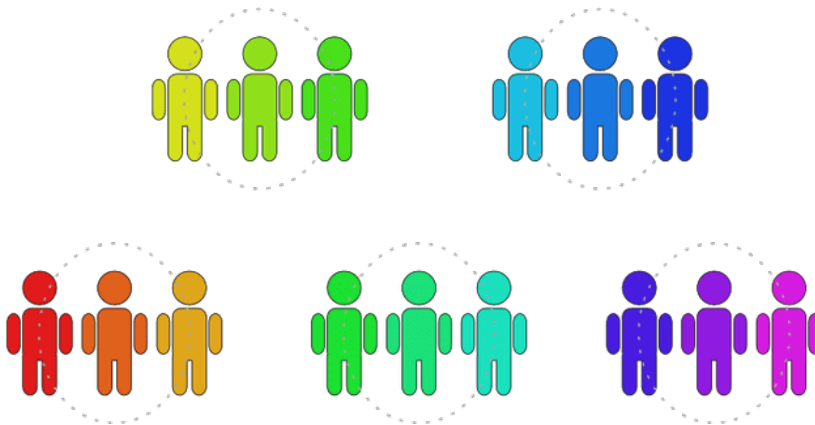


Figure 1: 'Race' cannot be biologically defined due to genetic variation among human individuals and populations. (A) The old concept of the "five races:" African, Asian, European, Native American, and Oceanian. According to this view, variation between the races is large, and thus, each race is a separate category. Additionally, individual races are thought to have a relatively uniform genetic identity. (B) Actual genetic variation in humans. Human populations do roughly cluster into geographical regions. However, variation between different regions is small, thus blurring the lines between populations. Furthermore, variation within a single region is large, and there is no uniform identity.

New findings in genetics tear down old ideas about race

Estimating our ancestral composition down to 0.1% seem to suggest that there are exact, categorical divisions between human populations. But reality is far less simple. Compared to the general public's enthusiasm for ancestry testing, the reaction from scientists has been [considerably more lukewarm](#). Research indicates that the concept of "five races" does, to an extent, describe the way human populations are distributed among the continents—but [the lines between races are much more blurred](#) than ancestry testing companies would have us believe (Figure 1B).

[A landmark 2002 study](#) by Stanford scientists examined the question of human diversity by looking at the distribution across seven major geographical regions of 4,000 *alleles*. Alleles are the different "flavors" of a gene. For instance, all humans have the same genes that code for hair: the different alleles are why hair comes in all types of colors and textures.

In the Stanford study, [over 92% of alleles](#) were found in two or more regions, and almost half of the alleles studied were present in *all* seven major geographical regions. The observation that the vast majority of the alleles were shared over multiple regions, or even throughout the entire world, points to the fundamental similarity of all people around the world—an idea that has been supported by [many other](#) studies (Figure 1B).

If separate racial or ethnic groups actually existed, we would expect to find “trademark” alleles and other genetic features that are characteristic of a single group but not present in any others. However, the 2002 Stanford study found that only 7.4% of over 4000 alleles were specific to one geographical region. Furthermore, even when region-specific alleles did appear, they only occurred in about 1% of the people from that region—hardly enough to be any kind of trademark. Thus, there is no evidence that the groups we commonly call “races” have distinct, unifying genetic identities. In fact, there is ample variation within races (Figure 1B).

Ultimately, there is so much ambiguity between the races, and so much variation within them, that two people of European descent may be [more genetically similar to an Asian person than they are to each other](#) (Figure 2).

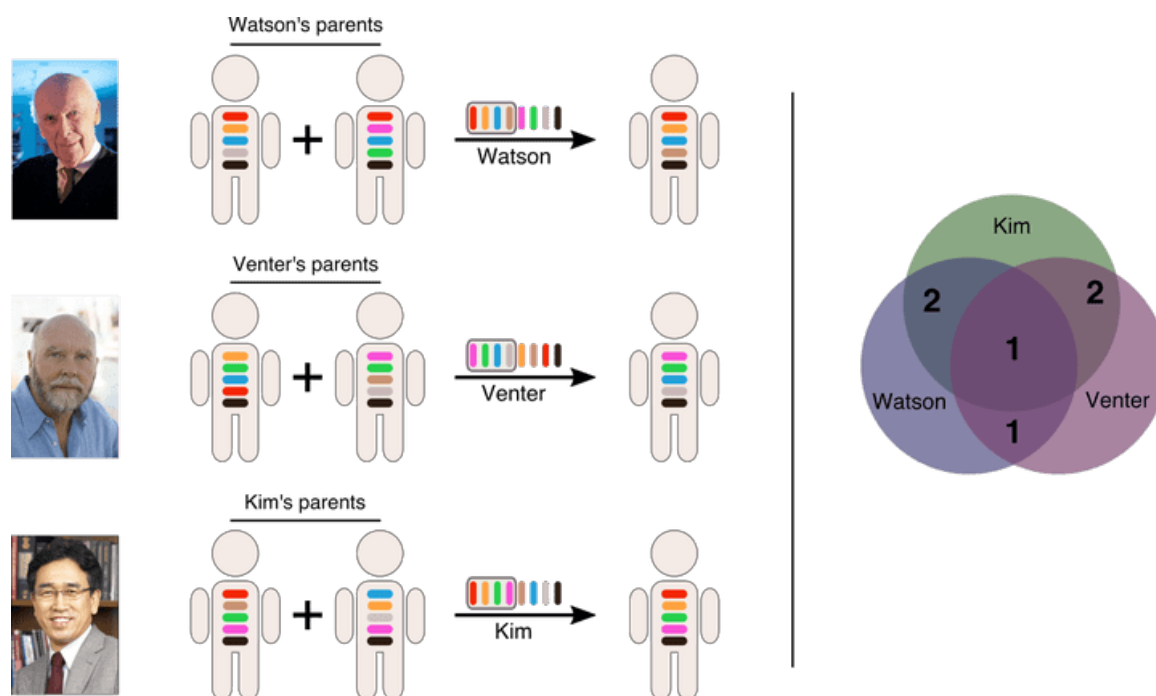


Figure 2: Case study of genetic variation between three scientists. Left: Schematization of the genetic variation between Drs. James Watson, Craig Venter, and Kim Seong-jin. Colored bars represent genes; different colors represent different alleles, i.e. versions of genes. Some alleles are shared by all three of the men (represented by the dark brown allele that is shared by every person in this image). Besides the universal dark brown allele, Watson and Venter share one other allele (bright blue). However, both share two alleles with Kim (Watson shares red and orange with Kim, Venter shares green and magenta), in addition to the universal allele. Right: There is more similarity between the Kim and Watson and Kim and Venter, than there is between Watson and Venter.

Does “race” still mean something?

The divisions between races are doubtlessly blurred, but does this necessarily mean that [race is a myth](#)—a mere social construct and biologically meaningless? As with other race-related questions, the answer is multi-dimensional and may well depend on whom you ask.

In the biological and social sciences, the consensus is clear: [race is a social construct](#), not a biological attribute. Today, scientists prefer to use the term “[ancestry](#)” to describe human diversity (Figure 3). “Ancestry” reflects the fact that human variations *do* have a connection to the [geographical origins of our ancestors](#)—with enough information about a person’s DNA, scientists can make a [reasonable guess about their ancestry](#). However, unlike the term “race,” it focuses on understanding how a person’s history unfolded, not how they fit into one category and not another. In a [clinical setting](#), for

instance, scientists would say that diseases such as sickle-cell anemia and cystic fibrosis are common in those of “sub-Saharan African” or “Northern European” descent, respectively, rather than in those who are “black” or “white”.

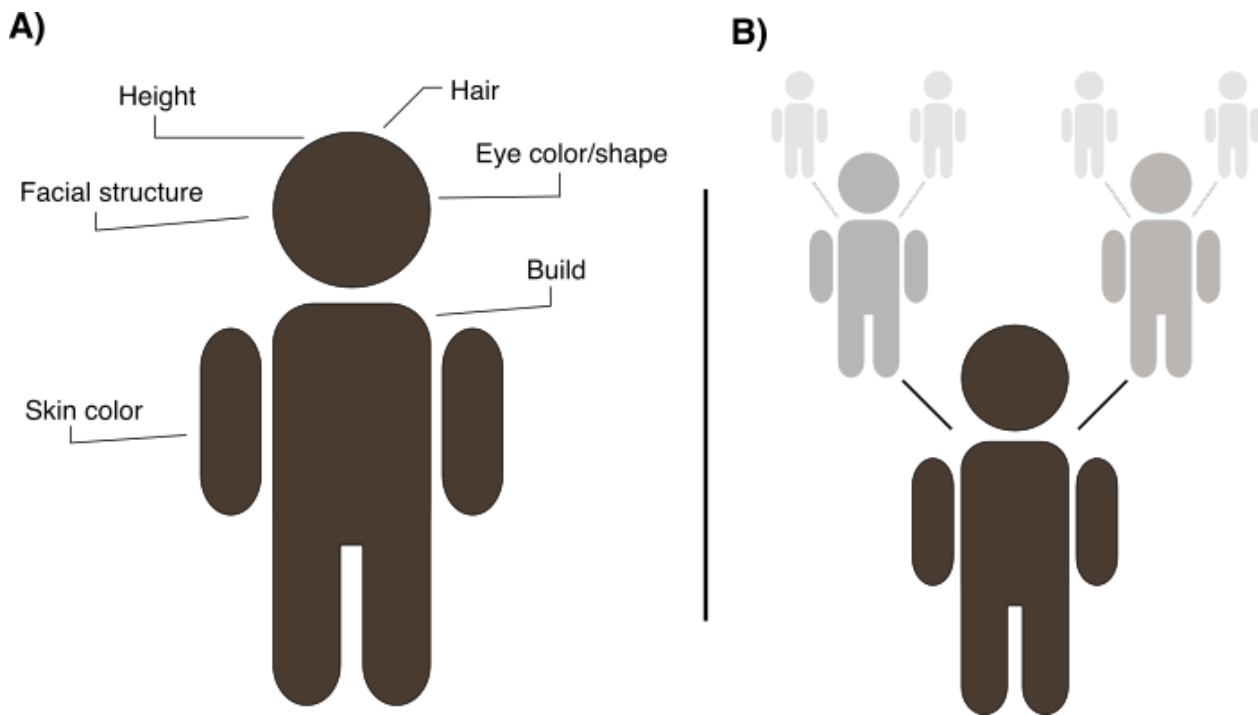


Figure 3: Race versus ancestry. (A) The classification of people into different races is typically based on observable physical features, with skin color being the most prominently used characteristic. Racial classifications also draw upon non-biological characteristics such as culture, language, history, religion, and socioeconomic status. Thus, “race” is a term that lacks clear definition. (B) In contrast to race, “ancestry” emphasizes the geographical origins of one’s ancestors (parents, grandparents, and beyond). Unlike “race,” the concept of “ancestry” does not focus on the static categorization of humans into groups, but rather on the process by which a person’s history unfolded.

However, even if scientists agree that race is, at most, [a social construct](#), any cursory search of the internet reveals that the broader public is not convinced of this. After all, if an Asian person looks so different from a European, how could they *not* be from distinct groups? Even if most scientists reject the concept of “race” as a biological concept, race exists, undeniably, as a social and political concept.

The popular classifications of race are based chiefly on skin color, with other relevant features including height, eyes, and hair. Though these physical differences may appear, on a superficial level, to be very dramatic, they are determined by only a minute portion of the genome: we as a species have been estimated to [share 99.9% of our DNA](#) with each other. The few differences that do exist reflect differences in environments and external factors, not core biology.

Importantly, the evolution of skin color occurred independently, and did not influence other traits such as mental abilities and behavior. In fact, science has yet to find evidence that there are [genetic differences in intelligence](#) between populations. Ultimately, while there certainly are some biological differences between different populations, these differences are few and superficial. The traits that we do share are far more profound

Science and genetics: Instruments of modern racism

Despite the scientific consensus that humanity is more alike than unlike, [the long history of racism](#) is a somber reminder that throughout human history, a mere 0.1% of variation has been sufficient justification for committing all manner of discriminations and atrocities. The advances in human genetics and the evidence of negligible differences between races might be expected to halt racist arguments. But, in fact, genetics has been used to further racist and ethnocentric arguments—as in the case of the [alt-right](#), which promotes far-right ideologies, including white nationalism and anti-Semitism.

Considered a fringe movement for years, the alt-right gained considerable attention and relevance during Trump's [presidential campaign](#). Indeed, Steve Bannon, [the current senior counselor and chief strategist](#) to President Trump and the [former chief executive officer](#) of Trump's campaign, [has notable ties to the alt-right](#). Once relegated to obscure internet forums, the alt-right's newest pulpit is the White House.

Members of the alt-right are enthusiastic proponents of ancestry testing as a way [to prove their "pure" white heritage](#) (with Scandinavian and Germanic ancestry being among the most desirable) and to rule out undesired descent from any other groups (including, unsurprisingly, Africans and the [Ashkenazi Jews](#), but even certain European groups, [such as Italians and Armenians](#)). The belief in white superiority, and the need to preserve it, drives the alt-right movement—and [genetics is both the weapon and battle standard](#) of this new, supposedly "scientific" racism.

Those who disagree with alt-right ideologies may assume that the alt-right is merely spewing ignorant nonsense. This is certainly true for some of the alt-right. What is perhaps a more difficult truth is that many of the alt-right do, in fact, understand biology and genetics to an impressive extent, even if this understanding is flawed.

For instance, alt-right proponents have stated, correctly, that [many people with European and Asian descent have inherited 1-4% of their DNA](#) from Neanderthals ancestors, and those of African descent [do not have Neanderthal heritage](#). They are similarly correct that Neanderthals had larger skulls than humans. Based on these facts, some within the alt-right have claimed that Europeans and Asians have superior intelligence because they have inherited larger brains from their Neanderthal ancestors.

However, this claim ignores that while there is evidence for the effect of Neanderthal DNA on [certain traits](#), there has been no evidence for its effect on intelligence. Furthermore, scientific research indicates that the Neanderthals [were not necessarily more intelligent](#) simply because they had larger skulls. Unsurprisingly, the alt-right tends cherry-pick the ideas that align with their preconceived notions of racial hierarchies, ignoring the broader context of the field of human genetics.

Fighting racism with understanding

Just as the alt-right is no longer an easily dismissed fringe group, their arguments have some factual basis, and cannot be swept aside as the babbling of the scientific illiterate. The alt-right is not clumsy in their use of science and genetics in their battle for their "ideals." Those who oppose the alt-right, and other racist entities, must arm themselves with the same weapons: education, namely scientific and genetic literacy.

Mounting scientific evidence has shown that humans are fundamentally more similar than different from each other. Nonetheless, racism has persisted. Scientific findings are often ignored, or otherwise actively misinterpreted and misused to further racist agendas of extreme political groups. Opponents of these forces must, through their own education and awareness, combat these misleading interpretations and representations of scientific findings.

Today, the question of "race" is no longer merely a political and social issue: as science has rapidly advanced, it has become irrevocably intertwined. The genome contains powerful insights about our biology that could unite us as a species, but which could also be dangerous and divisive if used without understanding. As we look forward to 2017 and onwards, it becomes ever more important to understand what our DNA says about what it means to be human.

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For more information:

[The Atlantic "Will the alt-right promote a new kind of racist genetics?"](#) (December 2016)

[Harvard Magazine "Race in a genetic world"](#) (2008)

[Livescience "Genetic ancestry tests mostly hype, scientists say"](#) (2007)

[Science "The science and business of genetic ancestry testing"](#) (2007; original paper cited in the *Livescience* article above)

[Nature Genetics "Implications of biogeography of human populations for 'race' and medicine"](#) (November 2004)