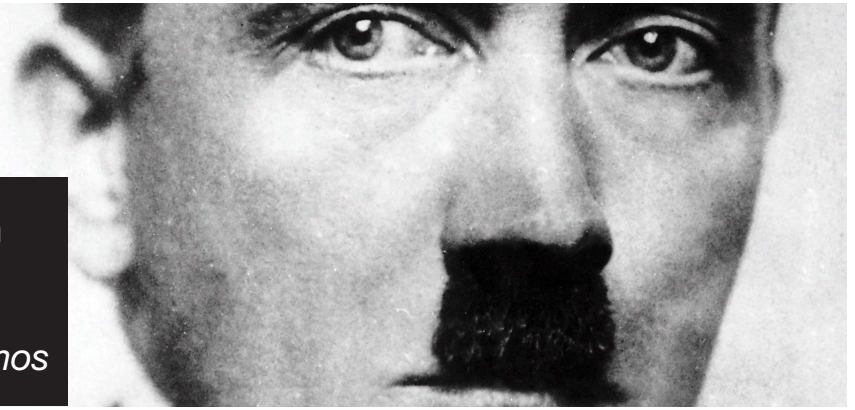


Interpreting Science

How it can be misinterpreted- with special reference to the racist science of eugenics

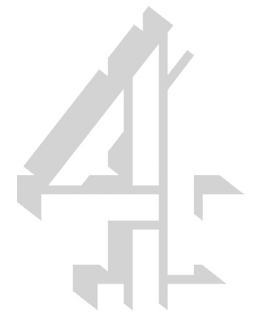
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Science is like sport or music: lots of people enjoy it as amateurs, a few pursue it as professionals and only a tiny fraction get to be world class. However, while anyone can appreciate the skills of a top musician or elite athlete, the same is not true of science. Scientists often disagree with each other and the public has little way of knowing who, if any, is right. Moreover, much of science comes to us second hand. Every year I mark essays written by Cambridge undergraduates, and every year I discover anew that even the best students are far from perfect in terms of explaining back what they have been taught, so what chance have the media got? The problem is that science is neither easy to understand fully, nor to explain well to others. It is full of difficult concepts and nuances, subtleties that are often lost or distorted as a message passes from researcher to journalist to sound-bite to public. A good example is provided by the history of racism and eugenics.

The word eugenics relates to the idea that humans can be 'improved' genetically in much the same way that agricultural scientists have improved crop yields in plants and productivity in livestock. Eugenic thinking was most prevalent during the early to mid 1900s and formed the backbone of Hitler's ambition to produce a 'superior race'. Today eugenics is viewed by most as ethically and morally repugnant. This antipathy is directed both at the concept that there are races which differ in quality, and at the methods used to cause 'improvement', namely selective breeding and, in Hitler's case, selective killing. Despite this, from a scientific viewpoint, the concept of eugenics contains elements that are perfectly sound. For example, inherited genetic disorders can be made rarer through genetic testing followed either by counselling or by selective abortion. The latter is somewhat controversial, but the former is being used today by the Jews to counter Tay-Sachs disease, an inherited disease that is common in this population. This is a very mild form of eugenics and is probably viewed as a good thing by most people. It is genetically improving one group of people.

So, where does misinterpretation come in? The answer is at almost every level. To begin with, putting aside all ethical considerations, there are technical difficulties with artificial selection. Some traits are relatively easy to change. If a despot decided tall people were good and only allowed unusually tall people to have children, height would increase. However, desirable traits like intelligence and beauty are more complicated and often have low heritability, i.e. children tend only weakly to resemble parents. Traits with low heritability take a long time to change through selective breeding, if they change at all. A second problem is that selective breeding means using only a few individuals to found the next generation and this leads to mating between relatives (inbreeding). Inbreeding tends to be bad. Ironically, intelligence is particularly badly affected, hence the term 'village idiot'. Another issue is that strong selection for one character often accidentally selects for other characters that are harmful. For example, one in five Dalmatian dogs is deaf because the gene for spots lies next to a gene that affects hearing. Indeed, pedigree dogs provide many examples of the problems that are likely to arise by



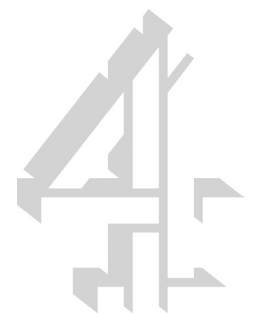
intense selective breeding, with bone defects, lower life expectancy, hugely inflated rates of cancer, hip problems and behavioural disorders all showing up. There are many other complications relating to selective breeding, but the take-home message is simple: even if Hitler had not been stopped, his attempts to produce a 'superior race' would likely have failed. He might have succeeded in creating a group of people who looked different, but the chances are that their intelligence and health would have got worse not better.

Beyond misunderstandings of the science come misinterpretations by a broader audience and, indeed, other scientists. One of the commonest mistakes involves selective use of results. Politicians do this all the time, saying things like 'violent crime rate is down' while failing also to admit that all other crime is up or that this is only in one part of one city. Similarly, a racist reading this very article would latch on to statements that some aspects of eugenics are founded in reality, but would probably ignore balancing statements about the impracticalities and misconceptions. For the politicians and racists, such omissions may be a deliberate attempt to paint the picture they want by using some facts but not others. Elsewhere the same effect could occur accidentally. Either way, the result is the same; the audience is misled even though the speaker has not actually lied.

Bearing in mind how a clever advocate can mislead without lying, the media tend to make things worse. Radio phone-ins and discussions are usually both pressed for time and insist on presenting both sides of the argument, even if the public cannot tell who is right. A good example is the study that seemed to show a link between becoming autistic and being vaccinated against measles, mumps and rubella (MMR). This study was flawed for complicated reasons that are poorly understood by many scientists, let alone the public. Those who understand the problems were given equal airtime to those who believed the story, creating an atmosphere of doubt. This was made worse by individual parents phoning in to say they 'knew' that MMR caused autism. These people were not trying to mislead, they simply failed to understand that one example never tells the whole story. With all this debate, many parents realised they could not judge and opted to 'play safe' by not vaccinating their children. Some of these children later needlessly developed the potentially deadly disease of measles.

So, the scientific messages we receive are often born out of complexity, filtered by those who, wittingly or unwittingly, distort the message and then presented to the public as digested sound-bites. How does this relate to racism? Take a step back. In many ways it is strange that 'race' is such a dirty word. As a scientist I find it extremely useful for describing groups of people who share particular attributes such as geographic origin, appearance or belief, but many find it offensive. The problem stems from our own social biology and the way we tend to try to form groups that strive for superiority. Most people feel some degree of pride in their school, their town, their local sports team, their country. Consequently, any term that classifies people into groups will tend to lay itself open to people who try to find reasons why their own group is 'better' or has a stronger claim to some territory. The word 'race' had the misfortune to be short, convenient and to have been in vogue at a time when our understanding of human genetics was poor while differences between populations in factors such as education and culture were large. Racists found plenty of ammunition for their beliefs by comparing themselves with people who looked different and had been educated differently.

A clear question arises: does science facilitate racism? I don't think so. Ultimately, good science is neutral, it furthers understanding regardless of whether this knowledge is used for good or bad. For humans, science has helped uncover genetic differences between populations that go well beyond



obvious differences in skin colour. This can lead to improvements in medicine but it also emphasises the inescapable truth, that humans vary. The politically correct say this variation is neither good nor bad, while racists use all the biases and misrepresentations they can to support their belief that they are somehow in a 'better' group. I am very much against racism, but as a scientist I have to accept that heritable traits vary across the world, and this even includes some aspects of 'intelligence'.

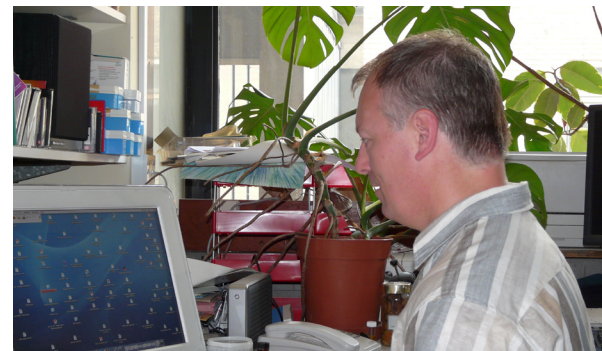
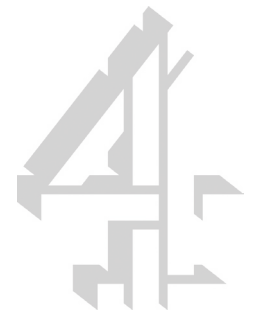
Race and intelligence have always been a controversial combination because, for many, intelligence is synonymous with quality. People fear a link being shown because of how racists would use such information. There are two elements:

- 1) does intelligence vary between races and, if it does,
- 2) can these differences be measured.

As a geneticist the answer to part 1 is clearly yes. Humans evolved greater intelligence after diverging from chimpanzees and evolution cannot work without heritable variation in the trait. Consequently, intelligence must show heritable variation. The answer to part 2 is almost certainly no, due to at least two big problems. First, intelligence is a catch-all term with many components, including memory, logic, problem solving, speed of thought and pattern recognition. Someone who is good at one skill may well be poor at another, so to treat intelligence as a single quantity is misleading. Second, and more importantly, what we think of as intelligence is very much a front. Our genes influence the hardware we are born with, our brains, but these only give us the *potential* to show intelligent behaviour. The extent to which any one person fulfils this potential depends largely on environmental factors; what they are taught and what they experience. Moreover, our brains are flexible enough to improve with practice. With such a shield of smoke and mirrors, it becomes virtually impossible to make meaningful measurements on innate brain function. The problem is like trying to work out which of two cars from the same production line performed better when it left the factory, based on what the cars look like after 100,000 miles with different drivers and different quality of servicing. No chance!

That intelligence remains too poorly understood and too difficult to measure for scientists to describe global patterns is probably a good thing: it is easy to imagine the prejudice and arguments that would follow if people from one part of the world were shown to be born with, for example, a marginally better ability to memorise things. Such controversy is best avoided.

In contrast, one strong pattern that seems increasingly evident is that some of the most beautiful and talented people in the modern world are mixed-race. Such a pattern vindicates classical genetic theory that increased diversity is generally good. In time, further study should help us understand why and how mixing is beneficial, but for the moment it is comforting to see the pendulum swing back: instead of being exploited as a source of evidence that populations differ, science now seems set to describe what could be seen as the hardened racist's worst nightmare! Indeed, if I had to put money on who would come out on top if intelligence could be quantified, all my personal research points me in one direction, towards people of mixed race people!



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(<http://www.zoo.cam.ac.uk/zoostaff/amos/>)