

well-founded. They also fail the second criterion of being answerable: we lack the theoretical or technical tools to study them.

The standard approach of population biologists to estimating the potential genetic contribution to a trait is to make a heritability estimate. Whatever the strengths and weaknesses of this measure within a population, it is essentially just that: a within-population measure, only valid for a given environment. The nature of the equations means that if the environment changes, the heritability estimate changes too. Moreover, the measure relates to a randomly interbreeding population — useful for agricultural purposes such as estimating optimal genotypes for crop yields or milk production — but not for people. Even if reliable correlations were found

between some intelligence test score and a measure of brain physiology or activity held by a specific group, such a correlation says nothing about the direction of causation.

As for the third and final criterion, if attempts to answer these group-difference questions are fraught with scientific fallacies, might there nonetheless be some public-policy implications making investigation worthwhile? The answer sometimes advanced is that if there were such differences, and their causes were understood, the less well-endowed groups could be 'compensated' by some form of differentiated education. But in practice, claims that there are differences in intelligence between blacks and whites, or men and women, have always been used to justify a social hierarchy in which white males continue to occupy the premier positions

(whether in the economy in general or natural science in particular). Using pseudoscience, based on concepts as ill-founded as phlogiston, to justify preordained conclusions should not serve as the basis of sound policy-making.

In a society in which racism and sexism were absent, the questions of whether whites or men are more or less intelligent than blacks or women would not merely be meaningless — they would not even be asked. The problem is not that knowledge of such group intelligence differences is too dangerous, but rather that there is no valid knowledge to be found in this area at all. It's just ideology masquerading as science. ■

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YES: The scientific truth must be pursued

The Soviet Union lost a generation of genetics research to the politicization of science when Trofim Lysenko, director of biology under Joseph Stalin, parlayed his rejection of Mendelian genetics into a powerful political scientific movement. By the late 1920s, Lysenko had denounced academics embracing Mendelian genetics, which some said undermined tenets of Soviet society. His efforts to extinguish 'harmful' scientific ideas ruined opponents' careers and delayed scientific progress.

It is difficult to imagine this situation repeating today, when rival views feed the scientific process, and inquiry and debate trump orthodoxy. Yet the spectre of Lysenkoism lurks in current scientific discourse on gender, race and intelligence. Claims that sex- or race-based IQ gaps are partly genetic can offend entire groups, who feel that such work feeds hatred and discrimination. Pressure from professional organizations and university administrators can result in boycotting such research, and even in ending scientific careers.

But hatred and discrimination do not result from allowing scientists to publish their findings, nor does censoring it stamp out hatred. Pernicious folk-theories of racial and gender inferiority predated scientific studies claiming genetic bases of racial differences in intelligence. Even if one does not support such work in the interests of free speech, it should be seen as supporting the scientific process of debate. Important scientific progress on these topics would never have been made

without the incentive of disproving one's critics.

There is an emerging consensus about racial and gender equality in genetic determinants of intelligence; most researchers, including ourselves, agree that genes do not explain between-group differences. But some issues remain unresolved, such as identification of mechanisms that bring genetic potential to fruition. Censuring debaters favouring genetic explanations of intelligence differences is not the answer to solving such mysteries.

There is a long history to both the study and the vilification of group differences in intelligence. In the late 1800s, Francis Galton, the father of eugenics, was acclaimed and was later knighted for his work. Cesare Lombroso, the scientist who claimed that criminality was inherited and evident in physical features, was also respected during his lifetime. Both were posthumously reviled by some, when their thinking became associated with Hitler's policies, mandatory sterilization and restrictive immigration policies. Nobel prizewinner William Shockley became a subject of controversy in the 1970s, after his work turned to racial differences in intelligence. In recent decades, the writings,

statements and teachings of Arthur Jensen, Michael Levin and John Philippe Rushton, also on racial differences in intelligence, have met variously with acclaim, outcries and demands for job termination. So have writings of Richard Herrnstein and Charles Murray on the differential distribution of IQ by race. And Frank Ellis,

a lecturer at the University of Leeds, UK, took early retirement in the face of an ethical storm that developed after he suggested in a student newspaper that intelligence levels were related to ethnicity. The list goes on. Many have been dissuaded from even looking at the research topic for fear of condemnation.

The outcries against those who speak of racial and gender gaps in IQ have become deafening, at times resembling Lysenkoism in language if not in deed.

Judged too fast?

Consider two recent high-profile cases. In 2005, Harvard's then-president Lawrence Summers suggested gender differences in intrinsic ability as one cause of the dearth of women in the top tier of science, rather than espousing the popular view that women's under-representation results from biased hiring, discriminatory tenure practices and negative stereotypes. Summers's insinuation of biologically-based sex differences in cognitive ability was radioactive, setting off debates on campuses and outpourings of editorials. Despite apologizing for reckless language — which his supporters felt research supported — he later resigned.

James Watson is the most illustrious scholar to have his career ended for reckless language. Watson's downfall was his assertion that "all our social policies are based on the fact that [African] intelligence is the same as ours — whereas all the testing says not really". Although he hoped everybody was equal, "people who have to deal with black employees find this is not true". Watson instantly plunged from A-list Nobelist to outcast, and was suspended from his chancellorship

"The dominant side goes unchallenged, forestalling the evolution of crucial ideas."



of Cold Spring Harbor Laboratory. Watson later clarified in a statement that he does not believe Africans to be genetically inferior, but this had little impact on the controversy.

Watson's first assertion could be read as scientifically supported: black Africans' IQ scores are lower than those of white Europeans. But Watson's use of 'intelligence' was interpreted as meaning 'intrinsic cognitive ability', ignoring how unfamiliarity with testing format, low quality of schooling, or poor health might depress IQ scores. There have been analyses showing average national IQs for sub-Saharan Africa to be approximately 30 points lower than average IQs for predominantly white European nations, and drawing a racial conclusion from those results^{1,2}. A refutation of these analyses would provide an opportunity to advance understanding. Sadly, although these analyses can be refuted, as we and others have done³, most of those who scorned Watson never knew they existed.

Attacks on Watson and Summers extinguished discussion by making moral attributions about their presumed character flaws rather than debating facts. But character attacks lead to a one-party science that squelches divergent views.

Some scientists hold more 'acceptable' views, ourselves included. We think racial and gender differences in IQ are not innate but instead reflect environmental challenges. Although we endorse this view, plenty of scholars remain unpersuaded. Whereas our 'politically correct' work garners us praise, speaking invitations and book contracts, challengers are demeaned, ostracized and occasionally threatened with tenure revocation.

Acts of censure edge close to Lysenkoism. They also do a disservice to science. When dissenters' positions are prevented exposure in high-impact journals and excluded from conferences, the dominant side goes unchallenged, and eventually its rationale is forgotten, forestalling the evolution of crucial ideas.

James Flynn, the foremost proponent of the environmental basis of intelligence, notes that when he first rebutted Jensen's hereditarian claims 30 years ago, he never anticipated later breakthroughs that evolved from the debate. Without Jensen, he has written, "I would never have made any contribution to psychology". His landmark documentation of the steady rise in IQ scores across generations and nations, known as the Flynn effect, might never have been done.

Such work has advanced our understanding of intelligence immensely. Flynn showed

in 2007 that the IQ of African Americans today is 10–15 points below that of white Americans, but equivalent to the score of such whites in 1947 (the racial groups described here are based on social constructs and rely on study participants defining their own race). Children in the United States and many European nations have surpassed their grandparents' IQs by more than 15 points in 60 years, so it is clearly possible to close the racial gap. This has been happening: 25% of this difference has been eliminated over 30 years⁴. IQ scores of offspring of German women and Second World War black US soldiers have been shown to be indistinguishable from scores of offspring of German women and white US soldiers⁴. No longer are there claims of a linear relationship



IQ tests got a bad name through association with immigration policy.

between IQ and European genes. It is now recognized that cultural effects are more powerful than previously thought.

Regarding gender, no one now claims women are unable to excel at complex maths: 48% of US mathematics majors are female, and women earn higher maths grades than men throughout schooling⁵. The maths gender gap among the top 0.01% of students, which 30 years ago favoured males 13-to-1, now favours males only 2.8-to-1 (ref. 5). Some nation's women (including those in Singapore and Japan) outscore US males on maths tests by an amount far larger than the gender gap within the United States⁵.

So, vigorous debate has resulted in great progress in our understanding, and more breakthroughs will come — if we allow free speech in science.

One could argue that some peer-reviewed reports feed racial and gender stereotypes. Perhaps such research should be forced to pass a higher cost–benefit threshold before publication. But this is a slippery slope: philosopher Jean-Jacques Rousseau argued that atheists should be silenced, lest they convince the masses to abandon faith, condemning them to hell. This

would now be viewed as a ludicrous violation of free speech. Who is to be impanelled with the wisdom to decide which views can be aired, and which research questions pass muster?

It might also be argued that only primary researchers who are experts in their field, rather than administrators or non-experts, deserve protected speech in these areas. A statement's validity, however, lies in its congruence with scientific data, not in the role occupied by its speaker.

One powerful argument states that groups need protection against bigotry, and that censoring one side in a debate is necessary to prevent the harm done to victims of race and gender arguments. Certainly, history offers examples of great harm befalling individuals due to flawed

scientific claims. Such problems, however, arise not from scientific discourse, but from political applications of those ideas. This is another matter entirely and must be subject to checks and balances.

In today's world, subjective perceptions of scientists' intent seem to determine a study's acceptability — work is celebrated if perceived as elevating under-represented groups (as with focuses on women and minorities in the search for personalized medicine), but reviled if perceived as documenting sex and race differences in intelligence without a focus on interventions to

eliminate them. Yet many future uses of knowledge cannot be anticipated; Flynn's research has since been used to overturn death-row sentences for mentally-retarded, disproportionately black defendants, for example.

When scientists are silenced by colleagues, administrators, editors and funders who think that simply asking certain questions is inappropriate, the process begins to resemble religion rather than science. Under such a regime, we risk losing a generation of desperately needed research.

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