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Article

In Defense of Merit in Science

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Abstract: Merit is a central pillar of liberal epistemology, humanism, and democracy. The scientific enterprise, built on merit, has proven effective in generating scientific and technological advances, reducing suffering, narrowing social gaps, and improving the quality of life globally. This perspective documents the ongoing attempts to undermine the core principles of liberal epistemology and to replace merit with non-scientific, politically motivated criteria. We explain the philosophical origins of this conflict, document the intrusion of ideology into our scientific institutions, discuss the perils of abandoning merit, and offer an alternative, human-centered approach to address existing social inequalities.

Keywords: STEM; Enlightenment; meritocracy; critical social justice; postmodernism; identity politics; Mertonian norms

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1. Introduction

We live in an incredible time of human history. As Barack Obama said: "If you had to choose one moment in history in which you could be born, and you didn't know ahead of time who you were going to be—what nationality, what gender, what race, whether you'd

be rich or poor, gay or straight, what faith you'd be born into . . . you would choose right now." While the benefits of significant global progress and economic development have not been shared equally, the world as a whole has never been healthier, wealthier, better educated, and in many ways more tolerant and less violent, than it is today.[1,2]

How did we get here? Science provided solutions to such calamities as famine and plague, transforming them "from incomprehensible and uncontrollable forces of nature into manageable challenges."[1] By improving the world economy and increasing global wealth, scientific progress helped create a more peaceful and just world. Science eradicated smallpox, discovered penicillin, decoded the SARS-CoV-2 virus in a weekend, helped to halve the maternal and child mortality rate globally, revolutionized agriculture, contributed to extending life expectancy in every country, and has generally granted humanity the gifts of life, health, wealth, knowledge, and freedom. By increasing literacy and communication, science has promoted empathy and rational problem-solving, contributing to a global decline in violence of all forms.[1,2]

Of course, serious problems continue to challenge us; poverty, inequality, wars, and violence persist. Climate change, biodiversity loss, antimicrobial resistance, and pandemic disease threaten global gains made over the past century. However, science continues to be the best tool humanity possesses to address these complex, collective challenges. Indeed, science holds the key to solving these problems—it provides the basis for renewable energy technologies, mitigating anthropogenic impact on the global climate, feeding the world's growing population, controlling pandemics, and eradicating debilitating diseases. Of course, science alone is not sufficient: science is but a tool that can be used for good and bad. It is our responsibility as a society to use it responsibly, ethically, and effectively.

Fulfilling this responsibility, however, is being hindered by a new, alarming clash between liberal epistemology and identity-based ideologies. Liberal epistemology prizes free and open inquiry, values vigorous discourse and debate, and determines the best scientific ideas by separating those that are true from those that are likely not. The statuses, identities, and demographics of scientists are irrelevant to this great sifting of valid versus invalid ideas.

In contrast, identity-based ideologies seek to replace these core liberal principles, essential for scientific and technological advances, with principles derived from postmodernism and Critical Social Justice (CSJ), which assert that modern science is "racist," "patriarchal," and "colonial," and a tool of oppression rather than a tool to promote human flourishing and global common good.[3–8]

In this perspective, we explain the differences between the two epistemologies and argue that meritocracy[9] (grounded in philosophical liberal epistemology), however imperfect, is the best and fairest way to conduct science. We endorse policies to mitigate existing inequalities of opportunities, but explain why CSJ-based policies are pernicious (CSJ differs from social justice as a concept[6,7]). Therefore, we offer a liberal, humanistic alternative that is compatible with maximizing scientific advances.

2. Merit-Based Science is Effective and Fair

Why science is an engine that propels societies to health, wealth, and prosperity—ultimately saving and improving lives worldwide—is well understood.[1,2] The cornerstone of science is the notion that objective truth exists and can be understood through observation, experiment, and iterative hypothesis generation. Because objective truth exists, ultimate consensus among truth-seeking actors—scientists—is possible.

The scientific method has proven an effective tool for revealing objective truths about the natural world. These truths are not final and immutable, but provisional—open to challenge and refinement as knowledge expands. For example, quantum mechanics has shown that the laws governing the motion of billiard balls and planets are not sufficient to describe the motion of nuclei and electrons. Yet, the Schrödinger equation does not invalidate Newton's Laws, which we continue to use to engineer cars, airplanes, and rockets. Rather, quantum mechanics expanded our understanding of reality by revealing that classical mechanics is limited to the macroscopic world. In much the same way, Einstein's theory of relativity did not negate Newton's law of universal gravitation—it extended it to include new phenomena such as black holes.

The scientific method is the core of liberal epistemology. In *The Constitution of Knowledge*,[10] Rauch addresses the current epistemological crisis by reaffirming the central tenets of liberal epistemology (developed by Popper, Albert, Weber, and others). Namely, that provisional truth is attainable and that a truth claim can be made only if it is testable and withstands attempts to debunk it (the Fallibilist Rule). He also emphasizes that no one has personal authority over a truth claim, nor can one claim authority by virtue of a personally or tribally privileged perspective (the Empirical Rule). Similarly, truth claims cannot be less valid by virtue of the claimant's membership in any particular group. Liberal epistemology implies that "positionality statements" (in which scientists disclose their demographic identity memberships and which are now being advocated throughout academia) have no value in evaluations of scientific claims,[11] since the validity of a truth claim cannot be evaluated by knowing the claimants' tribal or demographic affiliations.[12] In liberal epistemology, the validity of truth claims can only be evaluated by evidence and the logic of inferential processes linking that evidence to further conclusions.

However, evaluating the quality of that evidence or the validity of the inferential processes is itself a social process, a point upon which some liberal[10] and feminist[13] philosophers agree. In both Rauch's[10] and Longino's[13] perspective, no one has final say; scientific truths are determined by an ongoing social process that includes discussion, debate, and criticism until a broad consensus is reached (and which can be challenged by new evidence and arguments). Although both perspectives permit all members to participate in the social process of truth-seeking, in neither perspective is truth determined by the group-based identities of the claimant.

Further, reality-based scientific communities must be open to conceding and correcting errors. The ability of science to self-correct—one reason that scientific truth claims are uniquely credible[10,12]—can be epistemically contrasted with conformity to religious and political dogmas, which are disturbingly closed to self-correction. Self-correction is facilitated by pluralism to maintain intellectual diversity and maximize the chances of uncovering provisional truths. Intellectual diversity ensures vigorous skeptical vetting of scientific claims by a critical mass of doubters who ultimately accept being bound by objective truths once they have been rigorously determined by extensive evidence.

These core principles, which have served us well for centuries, are under attack by ideologies originating in postmodernism and Critical Theory,[6,10,14] versions of which reject objective reality in favor of "multiple narratives" promulgated by different identity groups and "alternative ways of knowing." They engender "radical skepticism about whether objective knowledge or truth is obtainable" and "a commitment to cultural constructivism," which asserts that knowledge and reality are products of their cultural context.[3,4] When claims about lived experiences and subjectivism are proposed to constitute a better basis for understanding the world than empirical evidence and facts, the identity of participants

in a discourse becomes more important than the substance of their arguments or the strength of the evidence, and objectively adjudicating claims becomes impossible.

These perspectives often view science as a tool of power, are hostile to the central liberal principle of free inquiry and open discussion, and are closed to calls to justify their claims on scientific grounds.[3,6,10,14]

Such ideologies suffer from at least two serious philosophical problems. The first is that their rejection of objectivity undermines their credibility. If there is no objectivity, then their claims are not objectively true. If their claims cannot possibly be objectively true, there is no reason for anyone to believe them. Their claims warrant serious consideration only if they might actually be true—which requires at least the possibility of objectivity.

The second is that these philosophies[3] conflict with a set of principles of modern science known as the Mertonian norms (see Figure 1).[12] Merton, a founder of sociology of science, formulated these principles based on his analysis of factors that enabled the scientific revolution and explained that they are dictated by the goals of science. Indeed, following these principles has served us well, and, as we argue below, a departure from these ideas has a long history of harming science.[15–19]

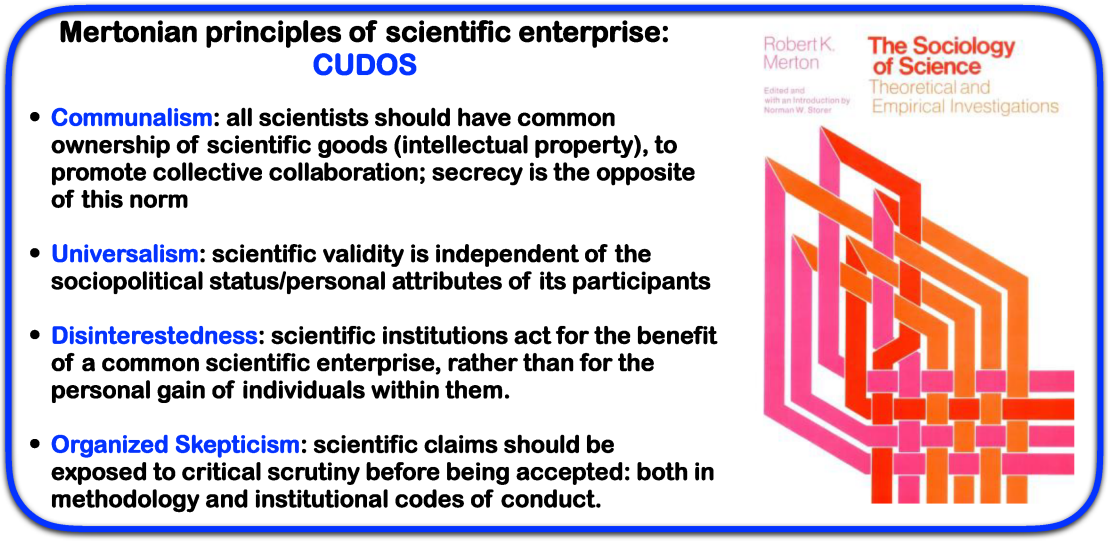

Figure 1: The Mertonian principles.

Together, the Mertonian principles imply that merit must be the key metric to judge and evaluate scientific claims. The merit of an idea should be evaluated through scrutiny and organized skepticism, essential components of scientific discovery. The ultimate test of the merit of a claim is its ability to accurately predict the functioning of the universe as elucidated through replicable experiment and observation, not whether it feels right or comports with a particular worldview or group interest. Ideological orthodoxies deserve no place in science.

To ensure that the best scientific ideas are put forth, merit must also be applied to evaluate research proposals and prospective students and faculty. Here, merit comprises the scientific claims contained in the research plans, the quality of the proposed methods, and the expertise and academic track records of the individuals involved.

Scientific truths are universal and independent of the personal attributes of the scientist. Science knows no ethnicity, gender, or religion. Of course, by itself, universalism does not prevent the personal views of scientists, which are influenced by culture and society, from affecting the practice of science. Indeed, scientists have not always lived up to the ideals of fairness and impartiality in evaluating merit. In the

past, scientific culture contributed to the exclusion of various groups from the scientific enterprise. For example, sexism limited women's entry into science, and those who helped raise awareness of such issues have done science a service. However, the shortcomings of individuals or the community should not be confused with the science itself. Whether sexism prevented Cecilia Payne-Gaposchkin from receiving credit for her conclusion that the Sun was made mostly of hydrogen is irrelevant to the fact that the Sun is made mostly of hydrogen. Although there are feminist critiques of how glaciologists have conducted themselves, there is no such thing as "feminist glaciology," just as there is no "queer chemistry," "Jewish physics," "white mathematics," "indigenous science," or "feminist astronomy."[20–22] Glacial, physical, genetic, or prehistoric phenomena are independent of the positionality of the scientist. By prioritizing the truth value of scientific research, personal influences of individual scientists are minimized.

Merit-based science is *truly* fair and inclusive. It provides a ladder of opportunity and a fair chance of success for those possessing the necessary skills or talents. Neither socioeconomic privilege nor elite education is necessary. Indeed, several co-authors of this perspective have built successful careers in science, despite being immigrants, coming from lower socioeconomic backgrounds, and not being products of "elite education" (see authors' biographies in the Supplemental Information). As an example of how the inclusiveness engendered by merit-based science benefits society, the first mRNA COVID-19 vaccine was developed by scientists with an immigrant background (Hungarian and Turkish) who built successful careers in Germany. Likewise, the founder of Apple, Steve Jobs, came from a poor adoptive family and did not have access to regular education.

Merit is a vehicle for upward mobility.[23,24] Recruiting, developing, and promoting individuals based on their talent, skills, and achievements has enabled many who started life in disadvantaged conditions to realize their dreams and build better lives. Imperfections in a merit-based system are not grounds for dismantling or disrupting it. Changes to an effective system should occur only when the superiority of the alternative has been demonstrated. There is no evidence that CSJ produces better mathematics, physics, or chemistry, and it has already damaged medicine and psychiatry.[25,26] While some might argue that CSJ has improved science by disrupting the barriers to entry for marginalized groups, those barriers had been falling for decades, without any help from CSJ dogmas, and long before CSJ rose to prominence and power. For example, in 1970, women received about 10% of all doctoral degrees in the U.S.; by 2006, they were receiving the majority.[27]

In order to achieve a more fair and equitable scientific community, we should strengthen meritocratic practices. It would be unjust and pernicious not to identify and nurture talent—wherever it may be found. Prioritizing merit-based science does not preclude other actions to enhance inclusivity, an issue we return to later.

3. How to Apply Merit: Caveats, Pitfalls, and Good Practices

The primacy of merit-based scientific truth claims raises the following question: How can we apply merit consistently and effectively? Although it may be straightforward to rank chess players, ranking prospective students, job applicants, tenure candidates, and scientific proposals is more difficult. Judgment may be affected by personal preferences, blind spots, and biases. Yet there are established good practices that have been honed and refined over decades.

In assessing merit and scientific promise, quantitative metrics have benefits, despite their limitations.[28] While merit cannot be quantified by simplistic formulas (e.g., number of publications times impact factor), using numerical data to quantify scientific output is a useful component of the evaluation because it provides a quantitative measure of productivity. Good practices currently use a combination of quantitative metrics and qualitative assessment, e.g., letters from reviewers assessing how influential, original, and innovative the work is.

Although we view objective quantifiable metrics (such as publications) as one important dimension of merit, merit cannot be reduced to bean counting. Is one superb publication more valuable than four pretty good ones? This is a judgment call about which different people and institutions may honestly disagree. And what makes a published report "superb" will differ among fields and institutions. Although subjective judgments should play an important role in evaluations of merit, we recognize that they are also most vulnerable to biases.

How, then, can the potential for bias be mitigated so that even subjective judgments have a laser-like focus on merit? We suggest that two questions are central to the evaluation of scientific merit (see Figure 2): (1) How important is the finding? (2) How strongly does the evidence presented indicate that the main claims are true?

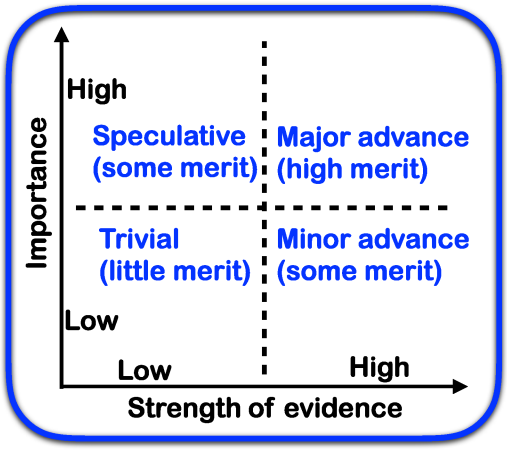

Figure 2: Guide for evaluation of merit.

Differences of opinion may exist regarding both of these dimensions. However, the key is that focusing on the importance of the finding and the strength of evidence can limit bias. Astronomers may value the discovery of a new exoplanet more than material scientists value improvements in ceramic tensile strength, but this is normal science and can be threshed out among scientists. The identity or positionality of the authors is irrelevant.

Merit also includes mentoring students. Again, numerical data related to the professional development of a candidate's mentees (papers published, conference presentations delivered, awards received, graduation rate, job placements, etc.) are helpful to build an overall assessment of merit. Academic promotion panels also consider teaching, professional and public service, and community engagement.

Many universities use quantitative indicators to compare individuals working in similar areas at similar career stages to detect deviations and create benchmarks of performance. It is recognized that quantitative metrics vary greatly among fields and depend on the nature of a position (e.g., teaching undergraduates versus graduate-level research) and this is justifiably taken into consideration when appraising academic performance.

Qualitative and subjective judgments are also important. There may be genuine differences of opinion about whether mentoring one student who goes on to be an academic research star is a greater or lesser accomplishment than mentoring five students, four of whom go into industry and one who becomes an academic at a small liberal arts college. But the value of *just counting*, however imperfect, should be obvious: all else equal, mentoring one star is better than mentoring no stars; mentoring four students who go on to professional careers in industry is more of an accomplishment than mentoring none. Again, though, the identity or positionality of the mentor is irrelevant to the evaluation of merit when using these sorts of quantitative metrics.

4. The Perils of Replacing Merit with Social Engineering and Ideological Control

4.1. Lessons from History

The universalism of science does not preclude culture and politics from being involved in funding priorities. Funders, whether government or private, expect to receive a return on their investment. Yet politicians should not dictate how science is done, and political agendas should not replace Mertonian norms. History demonstrates the dangers of replacing merit-based science with ideological control and social engineering.[16,17,19] In the Soviet Union (USSR), the aberrations of Trofim Lysenko had catastrophic consequences for science and society.[17] An agronomist and "people's scientist" who came from the "superior" class of poor peasants, Lysenko rejected Mendelian genetics because of its supposed inconsistency with Marxist ideology. Dissent from Lysenko's ideas was outlawed and his opponents were fired or prosecuted. Lysenko's ideologically infused agricultural ideas were put into practice in the USSR and China, where, in both countries, they led to decreased crop yields and famine.[17] Today, biology is again being subjugated to ideology—medical schools deny the biological basis of sex, biology courses avoid teaching the heritability of traits, and so on.[29,30] More examples of ideological subversion of science, relevant to physics and chemistry, were discussed in a recent viewpoint.[19]

Such analysis[19] is often dismissed with vague deflections such as "everything is political" and "everyone is biased." There is an element of truth to these declarations, which can help raise awareness of the potential of scientists to have biases, including biases on politicized topics, and help minimize such biases. However, those making these arguments often use them to impose their own ideological agendas on what can be studied and what kind of answers are permissible.[31] It is this sense of the politicization of science that we categorically oppose.

4.2. The Damage Inflicted by Today's Politicization of Science

The lessons from history are clear: ideological control of the scientific enterprise leads to its decline. The ongoing ideological subversion of STEMM (science, technology, engineering, mathematics, and medicine) education is particularly worrying. Ideological changes in the U.S., Canada, and New Zealand are already under way[32–34] and are quickly influencing other democracies.

The worst excesses of CSJ ideology are spreading to medicine, psychology, and global public health with worldwide implications.[25,26,35–37] For example, in global public health, the ideology manifests in the Decolonize Global Health movement, which calls for dismantling global health, questions research-based knowledge, emphasizes intergroup

and international antagonisms, and challenges universalism as an ideal for global health, humanitarian aid, and development assistance.[37]

CSJ-driven pedagogy can be pernicious, even when proposed innovations appear benign. For example, the proposed curriculum decolonization in pharmacology[38] involves teaching about drugs developed from folk remedies and focusing on the contributions of non-Europeans. While such topics might be appropriate for a history of medicine course, centering the curriculum around them, as has been proposed, would be detrimental to training health professionals. The vast majority of today's pharmacopeia is derived from the research and development efforts of the modern pharmaceutical industry; effective treatments derived from traditional medicine are rare, especially in the era of bio- and immunotherapies. For example, of the over 150 anti-cancer drugs available today, only three are of natural origin (trabectedin, taxanes, and vinca-alkaloids).[39] Decolonizing pharmacology also contributes to the public's infatuation with traditional medicine, while health agencies report numerous therapeutic accidents involving herbal products not validated following "colonial" standards.[40] Such pedagogy also reinforces mistrust toward "white medicine," feeding conspiracy theories against the pharmaceutical industry, as exemplified by campaigns against COVID vaccines, which, sadly, disproportionately impacted minority groups.[41]

Scientific research requires dedication, intensive technical training, and a commitment to rigor and truth-seeking. Weakening merit-based admissions, created to identify and cultivate the best and brightest, will have long-lasting consequences for the scientific workforce, discouraging or preventing many promising students from entering the field. Signs of this are already evident. The weakening of the workforce in the U.S. has contributed to that country's recent fall from the position of world leader in science.[15] If the movement in North America to replace merit with ideology in funding[42–45] and faculty hiring[46–50] progresses, further deterioration in the ability to foster excellence in research in the U.S. is all but inevitable. This does not bode well for the future of science and society globally.

Enforcing identity-based hiring is discriminatory,[51–53] as it deprives some high-achieving individuals, including economically disadvantaged individuals who are not members of politically favored identity groups, of opportunities they have earned,[54–57] thereby potentially damaging morale and engagement. In the U.S., this has resulted in the unfair treatment of Asian-American, Jewish, white, male, and foreign students.[32,52,53,56–59]

Ironically, replacing universalist principles with identity-based selection risks ultimately harming qualified underrepresented researchers by introducing doubt as to whether they merited their position or were hired for ideological reasons. Attempts to demonize, inflict reputational damage, or silence critics of social engineering practices by characterizing them as racists, white supremacists, or worse[46,60–63] is particularly detrimental to the open intellectual environment in which scientific inquiry into difficult social problems thrives. For every incident in which a scientist is targeted, thousands get the message and self-censor.[60,61,63]

Besides directly impacting the scientific enterprise, the ideological capture of scientific institutions[19,31,64] has broad consequences for society. Scientists and scientific institutions have a responsibility to enhance understanding and acceptance of the scientific consensus on matters of public importance. As seen with climate change and COVID-19, once a scientific topic becomes politicized, trust in science diminishes, laying the groundwork for science denial, conspiracy theories, and political opportunism.[37] Research has consistently shown that public acceptance of a scientific consensus is

driven not by scientific literacy (accepters are no more knowledgeable than deniers) but by political ideology and trust in scientific institutions.[65] When scientific institutions issue political position statements and adopt identity-based policies, they alienate and lose the trust of large dissenting segments of the public.[66] When prominent scientific journals promote these ideologies through editorials and perspective pieces, they magnify the alienation. Conflicting with the Mertonian principles of disinterestedness and universalism, these manifestos undermine the credibility of science as an objective, disinterested, and truth-seeking enterprise.[67]

5. The Genesis of the Current Attacks on Merit-based Science

The ideological basis of the current attacks on science emanates from certain veins of postmodernism and the identity-based ideologies they have spawned: various CSJ theories, including Critical Race Theory (CRT), related theories of structural racism, and postcolonial theory.[3–6,14]

These ideologies are increasingly finding their way into politics, culture, and education and are negatively affecting science, medicine, technology, psychology, and global health.[15,25,26,34,37] They are not imposed by totalitarian regimes, but spread by activists and abetted by university administrators and business leaders who fail to protect their institutions from these illiberal, regressive ideas.[60,63,68] The genesis of these ideologies is often obscure to the public or even to their bearers—e.g., administrators trained in Diversity, Equity, and Inclusion (DEI)—who are unlikely to have read Gramsci, Derrida, Foucault, Bell, Crenshaw, and Delgado. But just as a Soviet apparatchik need not have read *Das Kapital* to have been an agent ensuring conformity to Marxist doctrine, one need not be fully versed in postmodern or CRT-inspired scholarship to be implementing the ideology. The problems emerge from doctrinaire implementation, not from deep knowledge of the scholarship.

Critical Theory and CSJ conflict with the liberal Enlightenment. According to Delgado and Stefancic,[5] their characteristic elements include anti-rationalism; anti-enlightenment; rejection of equal treatment, philosophical liberalism, and neutrality in law; standpoint epistemology and subjectivism as the basis of knowledge; and intersectionality. Recently, ideas that emerged from Critical Theory have been aggressively disseminated to the public, notably in books by DiAngelo and Kendi,[69,70] now promoted as essential reading in many schools and universities.

Critical Theories seek to fundamentally change the practice of science.[10,14] Figure 3 contrasts CSJ epistemology with the ideas of the liberal Enlightenment.

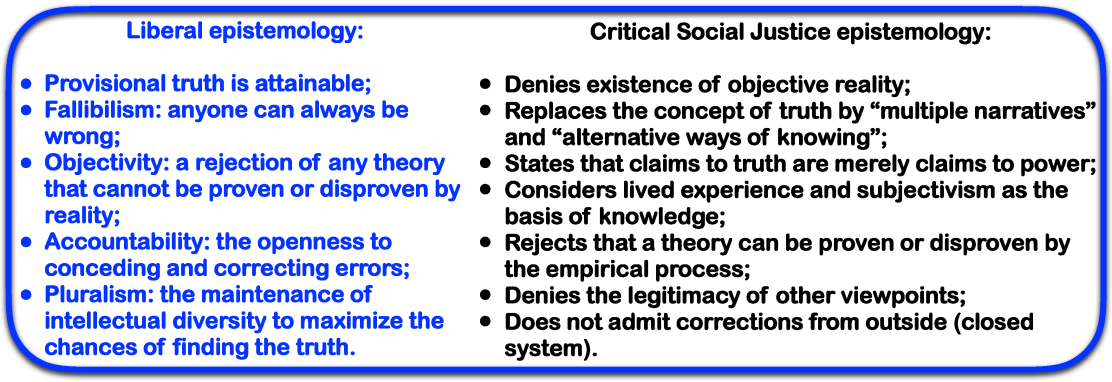

Figure 3: Liberal enlightenment versus CSJ epistemology.

CSJ is not an empirical theory, because its tenets are maintained despite their being either demonstrably false or unfalsifiable.[3,6,7,10,14] The existence of objective reality, for example, which CSJ denies, is attested to by every successful engineering project, from bridges to satellites, from cell phones to electric cars, ever conducted. The fallibility of "lived experience" is attested to by a wealth of psychological research demonstrating errors and biases in self-reports.[71] Yet, CSJ has found its way into STEMM, evoking parallels with the ideological corruption of science of past totalitarian regimes.[19] As an illustration, *The Lancet* published a paper in 2020 titled "Adopting an Intersectionality Framework to Address Power and Equity in Medicine"[72]—a call to adopt CSJ ideology in medical education and practice. This is reminiscent of the ideological control of science[16,17,19] and medicine[18] in the USSR. In medicine, Marxist ideology manifested itself in "'workerizing' ... [the] apparatus [of medical care]" (i.e., selecting future doctors from the working class, rather than the intelligentsia by means of class-based quotas) and prioritizing medical care for citizens based on class (the proletariat was to be given higher priority than the farm workers; the farm workers, higher priority than the intelligentsia; and so on).[18]

The CSJ view—that institutions of knowledge, art, and law perpetuate systemic racism and, therefore, must be dismantled, and that merit-based criteria in hiring, publishing, and funding must be replaced with CSJ criteria—has been aggressively advanced by many of our academic leadership—university administrators, executive bodies of professional societies, publishers, etc. A search for "racism" in the titles of papers published by the *Science* and *Nature* Publishing groups returns hundreds of hits such as "NIH Apologizes for 'Structural Racism,' Pledges Change,"[73] "Dismantling Systemic Racism in Science,"[74] and "Systemic Racism in Higher Education." This reflects the axiomatic ideological perspective of CSJ that systemic racism is indelibly etched into every Western institution. The perspective is taken as an article of faith, which is why some have argued that CSJ is more a secular religion than an evidence-based science.[75]

Below we discuss publications making unsupported claims of systemic injustices and attacking merit. Such publications rarely, if ever, provide evidence that observed disproportionalities in the race or gender distribution of a scientific field are the result of present-day structural or systemic racism. Whereas historical events, such as apartheid, slavery, and Jim Crow, are beyond dispute, the extent to which systemic racism influences STEMM or academia today is a contested question.[76] Its existence cannot be established by proclamation. In the absence of compelling evidence, these assertions are not scientific; they are dogma. In his book *Discrimination and Disparities*,[76] Sowell takes to task the central axiom of CSJ—that disparate outcomes for various social groups emerge as a result of discrimination—and presents ample evidence illustrating its fallacy. Sowell's arguments present compelling counterpoints to the standard set of arguments against meritocracy, such as those presented in *The Tyranny of Merit*[77] and *The Meritocracy Trap.*[78]

Space considerations do not permit a full evaluation of the arguments, many of which boil down to merit systems being imperfect; that is, that there are biases in judgments of merit, that they are not always implemented as promised, and that they risk creating hubris in the successful and despair among the unsuccessful. Our perspective is that, however valid these criticisms, merit-based systems are still immensely superior to alternatives that have either been tried before or are being proposed now.[77] Communist systems, for example, which are vastly more egalitarian, produced misery on an unimaginable scale.

Can newly proposed alternatives deliver better results? Let us consider an example. In *The Tyranny of Merit*,[77] Sandel proposes the following approach: identify some minimum standard that constitutes "qualified" for admission to Harvard or Stanford and

use a lottery system to select among those. Specifically, he mentions cutoffs that would treat 50–75% of applicants as "qualified," which stops short of abandoning merit altogether. He justifies these cutoff points by using anecdotal data about athletes who were overlooked by professional teams in early draft rounds, but who went on to have highly successful careers in their sport. But examples of a few overlooked individuals do not imply that merit-based selection is ineffective—indeed, players drafted early are much more likely to go on to professional careers.[79] Sandel also seems to presume that identically capable college applicants will suffer if some end up attending lesser schools. However, in STEM (science, technology, engineering, and mathematics), where education provides objectively assessable technical skills, attendance at a top university provides little advantage in students' earnings potential. Measured 10 years post-graduation, a top-tier education provided no significant earnings advantage for science majors and at best a marginally significant one for engineering majors.[80] Moreover, Sandel seems to be unaware that his strategy, by nature of being based on a lottery, guarantees that many candidates will end up in lesser schools than their equally qualified counterparts, an outcome that a merit system, by its nature, aims to minimize.

6. Exhibits of the Intrusion of Ideology into Science and Attacks on Merit

In recent years, numerous statements issued by scientific societies and papers published in *Science*, *Nature*, the *New England Journal of Medicine*, *The Lancet*, and other respected journals have been advancing CSJ ideology and attacking science and liberal epistemology.[20,21,34–36,43,72–74,81–124] Journals now publish entire topical issues dedicated to CSJ subjects. For example, in 2022, *Science* published the topical issue "The Missing Physicists: How Physics Excludes Black Researchers";[74,81–83] *Chemical Education* published a virtual DEI collection comprising 67 papers exploring such topics as decolonization of the chemistry curriculum, chemistry and racism, and gender and sexual orientation identities in the chemistry classroom;[84] *Inorganic Chemistry* published an issue celebrating "LGBTQIAPN+ inorganic chemists";[85] *World Scientific* published the three-volume set *Porphyrin Science by Women*;[86] and *Nature* published an editorial, "Science Must Overcome Its Racist Legacy," announcing four forthcoming special issues dedicated to the topic[87] (the first issue was published in 2022[88]).

Below, we highlight selected examples of such publications, grouped according to recurring themes. Common among them is revolutionary destructivism, which calls for the established structures and practices of science to be replaced by CSJ-based practices. Words like "excellence," "impact," or "quality" rarely appear, or appear only to be problematized (which, according CSJ, can be done to anything[4,6]). Instead, we see ample mention of "white supremacy," "discrimination," "harassment," "race," "gender," "violence," "intersectionality," and "marginalization," typically without citation to supporting evidence, an egregious failure for journals purporting to be about science.

These pieces fail to acknowledge the progress that has been made and continues to be made toward equality, fairness, and justice throughout the Western world.[1,2,27,76] Instead, they attribute, generally without evidence, the underrepresentation of any group in any domain to systemic racism or sexism in the present and within the domain itself.[76] This precludes an honest appraisal of the root causes of disparities and is likely to lead, therefore, to solutions that are ineffective, unjust, and damaging to science.[76]

The scientific community must come to the realization that such articles are not innocent expressions of well-meaning individuals. They are not exaggerations or outliers,

but are true to the creed of the ideology that produced them.[6,14] The sheer volume of these publications illustrates the extent of the ideological intrusion into science.

Below we analyze three recurring themes in these papers: (1) science is white and colonial; (2) science is racist; and (3) merit-based policies should be replaced by identity-based policies.

Theme 1: Science is white and colonial

For decades, Critical Theories had been confined to humanities and Studies departments of universities. But the ideas have spread to other disciplines and the outside world, where they have been picked up by activists and the press. Following the canons of CSJ, science is described as "white" and "colonial" and, therefore, should be dismantled. These ideas now routinely appear in some of the most influential scientific journals without citation to actual data supporting their claims. The apex journal *Nature* has created a "Decolonizing Science Toolkit,"[89] which includes articles such as "Institutions Must Acknowledge the Racist Roots in Science,"[90] "Decolonization Should Extend to Collaborations, Authorship and Co-Creation of Knowledge,"[91] and "Seeding an Anti-Racist Culture at Scotland's Botanical Gardens."[92]

Decolonization is already a reality. For example, in New Zealand, decolonization of the sciences by adding the mythological content from Mātauranga Māori to the science curriculum is now actively pursued throughout schools and universities with the support of the government,[33] and any criticism to this is termed racist.[101]

The decolonization theme has been amplified, ironically, by institutions whose supposed telos is to support science. An article published in *Nature* attempting to justify the decolonization of science in South Africa states: "Decolonization is a movement to eliminate ... the disproportionate legacy of white European thought and culture in education . . . dismantling the hegemony of European values and making way for the local philosophy and traditions that colonists had cast aside."[38] One might think, the article would identify how, for example, Newtonian physics or Darwin's biology went wrong and the errors were fixed by indigenous knowledge. It does nothing of the kind. Instead, it discusses the value of greater local involvement in science and having science education address local needs and interests. These laudable goals, which we hope succeed, have nothing to do with "the hegemony of European values." Indeed, the article acknowledges that "the meaning of decolonization is not well defined . . . " We doubt it can be because it is ideological rhetoric rather than a scientific statement with truth value.

In 2021, *The Lancet Global Health* invited and published the opinion piece "Says Who? Northern Ventriloquism, or Epistemic Disobedience in Global Health Scholarship," which purports to expose "epistemic violence" in the scientific literature.[93] The author calls for "epistemic resistance" to disrupt the accepted standards and practices in global health scholarship. She claims, "Epistemic violence is the active oppression by powerful structures to displace the marginalized from socioeconomic and knowledge-creating institutions to suppress their political voices. This exclusion incessantly erases contributions from LMICs [Low and Middle Income Countries] to global knowledge creation." She cites three sources to justify this alleged "incessant erasure"—all of which include a great deal of historical analysis but nothing recognizable as empirical evidence of said erasure in the present.

Papers calling for "decolonization" of practically every domain of STEMM are mushrooming in the literature, with little opposition. A rare exception[37] critiques the notion of decolonizing global health. The authors articulate the harms of the decolonization agenda, namely, that it undermines confidence in scientific knowledge, promotes

intergroup and international antagonisms, disregards the possibility of progress, and, most importantly, closes the door to achievable change in an unequal world. Dismantling global health will not give us better treatments for debilitating diseases or tools to control the next pandemic.

Theme 2: Science is racist

Race has become a central political and social issue in the U.S. and beyond. Learned societies and institutions, including the National Academy of Sciences (NAS),[94] the National Academy of Engineering,[95] the National Academy of Medicine,[96] and the National Institutes of Health,[73] have issued statements asserting, without evidence, the existence of systemic racism among their ranks and pledging to combat it. The American Physical Society, the American Geophysical Union, the Geological Society of America, the Society for the Study of Evolution, the National Association of Geoscience Teachers, and their sister societies outside the U.S. have published similar statements. Numerous university science departments have followed suit. In the journal *Science*, chemist Holden Thorp claimed (ironically, without evidence) that "evidence of systemic racism in science pervades this nation [the U.S.]."[97] In an unsigned editorial, *Nature's* editors stated that "scientific institutions were—and remain—complicit in systemic racism" and pledged to "end anti-Black practices in research."[98] The American Chemical Society published an editorial signed by all senior editors alleging the existence of systemic racism in chemistry publishing. Among several action points, they pledged to include "diversity of journal contributors as an explicit measurement of Editor-in-Chief performance."[99]

A *Nature* editorial[100] in 2021 reaffirms this narrative: "Racism in science is endemic because the systems that produce and teach scientific knowledge have marginalized and ill-treated people of other skin colors and under-represented groups for centuries"; organizations "must ensure that anti-racism is embedded in their ... objectives and that such work wins recognition and promotion"; and "too often, conventional metrics—citations, publication, profits—reward those in positions of power, rather than helping to shift the balance of power." *Nature* continued this theme in a recent editorial, calling for the decolonization of science and arguing that past racism has left "an indelible mark on science." In 2022, the journal released a volume, titled "Racism,"[88] which includes personal accounts of several authors of perceived racism throughout STEMM, including artificial intelligence and computer science, genetics, plant biology, and medicine (citing oxygen-sensor inaccuracy in Black people), as well as more general contributions on how to confront "imperialism's long shadows" and its racist past.

In 2022, *Science* published the special issue "The Missing Physicists: How Physics Excludes Black Researchers" featuring an editorial "Dismantle Racism in Science"[74] and several pieces with titles such as "Can U.S. Physics Overcome Its Record of Exclusion?,"[81] "The Toll of White Privilege,"[82] and "Fix the System, Not the Students."[83] The recurring themes are that physics is racist and exclusionary, run by a "white priesthood," and based on "white privilege"; that existing programs do not serve women or minorities, who purportedly need a different educational approach; and that merit-based evaluations must be relaxed to increase diversity in science, and that this will benefit the field.

As is typical when viewed through the lens of Critical Theory, these assertions were not buttressed by actual evidence of systemic racism—the existence of quantitative disparities was the only evidence required.[76] This may be valid in a dogmatic ideological framework that attributes all inequality to "isms." But from a scientific perspective, assertions require evidence and correlation does not imply causation. In fact, the

assertion that all inequality in the present is determined by discrimination in the present is readily refuted by evidence. For example, Asian Americans earn more advanced degrees and have higher incomes than do white Americans.[125] The notion that all inequality reflects systemic racism leads to the absurd conclusion that the U.S. is an Asian supremacist country. Many more examples of this kind can be found in *Discrimination and Disparities.*[76]

Articles accusing science of racism often support their claims by historical examples of scientists who held racist beliefs—like those in Darwin's day who, while they may have been abolitionists (like Darwin himself), still believed in a racial hierarchy of intelligence with white people on top. But one would be hard-pressed to give examples of institutional features today that foster discrimination and are responsible for the dearth of minority scientists in STEM. For example, the authors of the *Nature* editorial[87] support their claim of *current* systemic racism by asserting that people like J. D. Watson, C. Murray, and R. Herrnstein are racist. Even if true, three anecdotal cases do not indict science itself as rife with systemic racism. Several contributions to the topical issue on racism published by *Nature*[88] also support claims of current systemic racism by personal anecdotes. A paper in *Nature Geoscience* titled "Scientists from Historically Excluded Groups Face a Hostile Obstacle Course"[103] supports the title thesis by citing a tweet and a peer-reviewed paper based on "an interpretation of the dream of an African American woman" (refs 5 & 6 in 103).

The proposed solutions—to a problem that has not been shown to exist—endanger the integrity of the scientific enterprise. Scientific positions, grants, and article acceptances should be awarded on the basis of their quality rather than treated as commodities to be distributed based on identity categories. The telos of science is the search for provisional truth and the production of knowledge, not the redistribution of rewards to achieve activists' visions of equity or reparative justice.

Claims of systemic racism in academic research have spilled over into applied domains, notably medicine.[25] An article, "An Antiracist Agenda for Medicine," characterizes the handling of the COVID-19 crisis as "ongoing genocide, shamefully, if quietly, embedded in a centuries-old legacy of structural, scientific and medical racism."[129] That the absurd comparison of the COVID-19 crisis to genocide made it into print is consistent with a growing body of evidence suggesting that, in the "right" circles, one can make almost any ridiculous claim, as long as one frames it as advancing "Social Justice."[130]

The American Medical Association has produced a guide to language, asking practitioners to avoid using adjectives such as "vulnerable" and "high-risk" and to avoid saying "target," "combat," or other "terms with violent connotation" because they reinforce "narratives that constantly shift and adapt as conditions change and serve to rationalize the privileges of racism that sustain white supremacy."[35] These recommendations and similar DEI guidelines issued by the American Association of Medical Colleges[34] are set to be implemented in medical schools' curricula.

The American Psychological Association makes a lengthy apology to people of color for the association's supposed role in "promoting, perpetuating, and failing to challenge racism, racial discrimination and human hierarchy in the U.S."[36] They promote a radical, non-evidence-based, untested psychotherapy that encourages patients to see their problems through a lens of power and race, a recommendation flagrantly abandoning known best practices, such as centering therapy on the concerns of the patient, rather than those of the therapist,[26] and cognitive behavioral therapy. This is not science; it is ideology and, arguably, malpractice.

Theme 3: Merit-based policies should be replaced by identity-based policies

Many scientific fields are now under pressure to rethink how research is conducted. The forms of pressure range from injunctions to increase the diversity of researchers to calls to eliminate merit-based metrics of the performance of students, postdocs, and faculty.[74,81–85,104–106] The existing standards are purported to be "white," "colonial," "sexist," and insufficiently inclusive. Traditional success and impact metrics (e.g., citations and impact factors) are claimed to be "flawed and biased against already-marginalized groups" and to perpetuate "sexist and racist 'rewards.'"[105]

Major scientific journals such as *Nature*, *Science*, and their sister publications regularly publish opinions, editorials, and letters to the editor calling for increasing the number of women and selected minorities among tenure-track faculty, graduate students, award recipients, conference speakers, and editorial boards. In response, scientific institutions have begun implementing identity-based practices and social engineering.[52,62,107,108] Some faculty hiring committees are prioritizing diversity over merit or even using ideology as a filter by, for example, eliminating candidates solely based on DEI statements.[47,48,51]

Many scientific societies now encourage or require identity-based quotas for speakers and award recipients.[108] NAS now penalizes its nominating committees if their nominations are insufficiently diverse.[62,107] If one has any doubt that CSJ ideology is replacing merit-based science, this quote from McNutt (president of the NAS) and Castillo-Page (its Chief Diversity and Inclusion Officer) is the smoking gun: "Not so long ago, the NAS might have naively argued that its membership could not reflect the diversity of the American public it serves until universities fixed the 'leaky pipeline' of too many women opting out of careers in scientific research almost before they begin, or until elementary and secondary schools started motivating more students of color to study STEMM disciplines and prepared them for success in college and beyond. But in 2021, it is simply not acceptable to wait for 'bottom-up' solutions."[107] This implies that membership in the Academy should reflect an aspirational dream of proportional representation, rather than the real demographics of the most-meritorious scientists. The secretary of the NAS revealed how this will operate: "We assign slots [to different fields] based on the diversity of the lists of nominees that get forwarded" and "If they used [their slots] to pick a bunch of white guys from Harvard, they get penalized."[62]

In some ways, this is trivial concerning the production of science. Membership in NAS is not science; it is an honor in recognition of contributions to science. In that sense, it is a reward to be distributed, not a scientific discovery or invention of any import. But if we continue to subjugate meritocracy to CSJ by failing to reward the best-performing individuals and recognize the most creative and influential work, we risk eroding scientific excellence. When NAS signals "this is the way we provide scientific rewards," other scientific institutions will follow their lead.

Race- and gender-based selection for honors, conference presentations, and awards undermines the achievements of individuals from underrepresented groups by creating an impression that women and minorities cannot compete in an open marketplace of ideas and talent. It is also offensive to know that one's research was selected, not strictly for its merit, but at least partly due to one's ethnicity or gender. This is "the soft bigotry of low expectations"—the creation of different standards based on the perceived or real historical oppression of some individuals.[75]

Some form of affirmative action might be effective in college admissions, when students do not yet possess demonstrated credentials and many have lacked educational opportunities. However, when preferential selection goes overboard, e.g., when the mean scores on admission criteria of affirmative action students is a standard deviation (or more) below those of students admitted under conventional standards, the practice becomes counterproductive in helping underrepresented groups to advance.[131] This failure of affirmative action in the U.S. is well documented; despite being in place for more than half a century in U.S. colleges, race-conscious admissions have not led to proportional representation in STEMM.[52] The total number of Black students matriculating in U.S. medical schools has not changed in over three decades.[131] This is striking because, in the U.S., students from minority backgrounds indicate more interest in STEM than white students: a 1985 study of 27,065 incoming freshmen in 388 colleges found that the initial interest in STEM majors was 53%, 34–35%, and 17% for Asian American, Hispanic/African American, and white students, respectively.[52] Despite this initial interest, the rates of graduation with STEM majors vastly differ: 70% of Asian Americans persist in their ambition compared to 61% of whites, 55% of Hispanics, and 34% of African Americans. The disparities are even more extreme at elite institutions.[52] The analysis attributes this attrition to academic mismatch—by admitting minority students to schools that do not match their academic preparation, these students are at a disadvantage and often drop out or change to non-STEM majors, ironically, often to identity studies. In better-matched schools, students do well and graduate in STEM fields. Paradoxically, strong affirmative action appears to lead to a decrease of African- and Hispanic-American students entering STEM fields.[52]

CRT-informed social engineering is now present in every domain of science, including publishing, hiring, and research funding.[42–53,62,73,83,99,100,105–109,111–115,121,122,126–128] The Royal Society of Chemistry has issued a quota of 35% representation of women on editorial boards and in reviewer pools[108]—considerably greater than the current representation of women holding tenure and tenure-track positions in chemistry departments (~20%).[132] Australia's National Health and Medical Research Council will allocate half the funding for its largest research program to women and non-binary applicants.[109]

Some journal editorials have begun urging authors to preferentially cite "articles led by colleagues from different gender identities and geographical areas,"[110] in the spirit of "citation justice."[111–114] Tools to implement "citation justice" already exist.[133,134] The publisher Elsevier encourages authors to apply "citation justice" on a voluntary basis,[127] while other publishers have implemented policies, such as mandatory DEI statements,[115,128] to that end. The promoters of "citation justice" justify the practice by the assumption that differences in citation rates are due to racist or sexist biases in publishing (135 and ref. 3–16 therein). This, however, is an unsubstantiated claim, as we discuss below.

Claims of bias in STEM, which now pervade the literature, are typically based on anecdotal evidence, superficial analyses, or ideologically based assumptions. A typical example is a paper that alleges the existence of gender bias in chemistry publishing based on a superficial analysis of publication statistics.[135] Although the authors found gender differences in various metrics of professional accomplishment, the differences were small—e.g., on the order of one percentage point in manuscript acceptance rates. Moreover, the authors failed to adequately control for potentially confounding factors (e.g., seniority of researchers) that could explain the observed gender discrepancies. Yet,

despite this paper's poor scholarship, it has been cited as evidence of biases in chemistry and used to justify imposing gender quotas on editorial boards and in reviewer pools.[108]

When confounding factors are controlled, evidence of gender bias in STEM all but vanishes. Controlling for confounding variables, a recently completed quantitative synthesis of the literature on gender gaps in six academic science domains (manuscript acceptance rates, recommendation letters, tenure-track hiring, grant funding, salaries, and teaching ratings) found convincing evidence of bias only in teaching ratings, and the oft-cited gender pay gap of 18%[119] was reduced to 4%. In the other five domains, the authors concluded that there has been "no systematic gender bias in the last 10–20 years."[120] Similarly, a recent encyclopedic review of the literature on gender gaps in STEM found that "the evidence for endemic anti-female bias is inconclusive at best," and that, instead, "the main cause of the gender gaps in STEM appears to be average sex differences in people's vocational preferences."[121]

Furthermore, there is no evidence that introducing identity-based biases to the peer review process will do anything to improve science. Adding citational "representation" to redress grievances makes sense only if one views citations as rewards to be distributed rather than as acknowledgments of scientific contributions. Although the current peer-review system is not perfect and is sometimes affected by personal biases, these imperfections do not justify adding non-scientific considerations to review processes. Bias should be eliminated by procedures that cleave to truth and rigorous evidence, not by reversing the direction of the biases or adding irrelevant noise. Intentionally adding biases and imperfections erodes the integrity of the literature.

In a similar vein, institutions justify mandatory DEI training by alleged implicit biases, based mostly on the implicit association test (IAT), which is riddled with conceptual, theoretical, empirical, statistical, and methodological limitations, weaknesses, and artifacts.[136] Indeed, there is no evidence that receiving implicit bias training or reducing implicit bias as measured by the IAT reduces discriminatory behavior.[137]

In hiring at many universities, faculty applicants are now required to write DEI statements.[46–48,51] In recent faculty searches in the life sciences at UC Berkeley, three-quarters of the candidates were eliminated solely on the basis on their DEI statements.[47] Putting aside separate objections that the use of DEI statements to screen applicants constitutes a political litmus test and a form of (possibly illegal) compelled speech, by reducing the viable applicant pool, it likely undermines the quality of science.[130] Thus, a brilliant mathematician (or physicist or cognitive scientist) may be filtered out by virtue of having expressed insufficient enthusiasm or familiarity with the particular version of DEI that the institution supports.

DEI statements are often expected to embrace CSJ; statements that express support for the ideals of liberal social justice, such as Dr. Martin Luther King Jr.'s dream of a colorblind society, are rejected. As UC Berkeley's sample rubric for evaluating diversity statements states, candidates who intend to treat "all students the same regardless of their background" will be given the lowest score.[126] In 2021, job advertisements for STEMM faculty often devote more space to DEI requirements than to actual technical qualifications. As McWhorter notes, job advertisements for physicists now sound like advertisements for social workers or anthropologists.[138] Some universities have begun to incorporate DEI statements in tenure and promotion.[49] The process of evaluation needs to be reformed, according to a 2022 paper in the journal *eLife*, which provides "A Guide for Writing Anti-Racist Tenure and Promotion Letters."[122] The authors recommend that the letter writers include their positionality statements, invite the evaluation committee

to reflect on "white supremacy culture" in academia, and redefine what is considered to be meritorious.

In research funding, some grant programs now require that applications include an explanation of how the proposed project will address the principles of DEI.[42–45,138] Failure to adequately address DEI bears the risk of rejection. Should government funding advance science—fundamental research, energy solutions, health, and medicine—or social engineering? McWhorter notes:

> The notion seems to be that practitioners and scholars, across disciplines, must devote a considerable part of their time to putatively antiracist initiatives. It's a bold proposition, but given how shaky its actual justification is, it is reasonable to think that lately this devotion is being imposed by fiat, as opposed to being an organic outpouring. And if the price for questioning that notion is to be seen as sitting somewhere on a spectrum ranging from retrogressive to racist, it's a price few are willing to pay. One is, rather, to pretend.[138]

Europe, like the U.S., is susceptible to the ideology of identity.[102,116–118,123,124] One of the five pillars of the 2021–2027 agenda of the European Union is developing a "more social and inclusive" Europe.[124] To implement this noble vision, most European calls for STEMM funding (e.g., Horizon Europe) require plans demonstrating how proposed research will benefit underrepresented minorities. Venerable institutions with a history of promoting excellence and being merit-driven, such as the German Science Foundation, the Alexander von Humboldt Foundation, and the Max Planck Society, have issued generic pledges to advance diversity, formulated in CSJ terms. More than 200 institutions from around the globe signed the Alba Declaration on Equity and Inclusion, which asserts that bias against women and minorities in STEM is ubiquitous and calls for social engineering.[118]

7. The Way Forward

Science has been the driving force behind unprecedented improvements in the global quality of life—from advances in medical diagnostics and cancer treatment to the information technology revolution, from the growth of agricultural productivity to the development of sustainable energy. Science and technology are global and highly competitive. If dismantling the merit-based practices of the U.S. and other democratic countries continues unabated, the loss of leadership in developing cutting-edge technologies is likely to eventuate.

For science to succeed, it must strive for the non-ideological pursuit of objective truth. Scientists should feel free to pursue political projects in the public sphere as private citizens, but not to inject their personal politics and biases into the scientific endeavor. Maintaining institutional neutrality is also essential for cultivating public trust in science.[65] The rush to create systems institutionalizing racial, ethnic, and gender preferences in college admissions and hiring will further corrode public trust in academia and science (e.g., surveys from the U.S. show that most Americans, including most Americans of color, reject such preferences[66]). Although no system is guaranteed to eliminate all biases, merit-based systems are the best tool to mitigate it. Moreover, they promote social cohesion because they can be observed to maximize fairness.

Admittedly, meritocracy is imperfect. The best and brightest do not always win. But the idea that meritocracy is *nothing but a myth* is demonstrably false, indeed absurd.

Were it but a myth, college admissions and hiring could be conducted without regard to applicants' qualifications, and students or employees could be selected at random.

The role of science in rectifying social inequalities goes beyond "trickle-down" effects of scientific progress. Science can help to develop programs addressing both the root causes of inequalities and the effectiveness of remedial policies. Recent works by Banerjee and Duflo illustrate how well-founded scientific methodology can narrow the gap between rich and poor countries.[139] Heckman's work quantifies the impact of pre-school education on students' success.[140] In the field of artificial intelligence, one of the most active areas of research is concerned with discrimination,[141] fairness,[142] and social accountability.[143] The distinctive features of these examples, setting them apart from CSJ, are that they are based on scientific evidence and logic and they address the root causes of inequalities, rather than their symptomatic manifestations.

There is a large literature in the field of psychology on the role that demographic biases play in how we judge individuals.[144] Such biases are real and a justified concern, but fighting them with opposite biases and undermining merit is counterproductive. Two of the most robust findings in the literature are: (1) people massively judge others on their merits when their merits are clear and salient; and (2) in such situations, stereotypes and implicit biases[145] are minimized. Thus, a sharp focus on merit minimizes bias and maximizes the chances that those who best meet the relevant standards (for admissions, hiring, publication, or anything else) will be rewarded, thereby promoting inclusion. For example, standardized tests can help to fairly evaluate applicants from diverse backgrounds[55] and—if used properly—increase diversity.[54] A strict focus on merit, properly implemented, also reduces the influence of bias, department politics, nepotism, and favoritism, thus facilitating diversity, while maximizing scientific quality and the public's confidence and trust in the academy and science.

How do we begin the process of depoliticizing science and strengthening merit-based practices? We offer six concrete suggestions:

- Insist that government funding for research be distributed solely on the basis of merit.
- Ensure that academic departments and conferences select speakers based on scientific, rather than ideological, considerations.
- Ensure that admissions, hiring, and promotion are merit-based and free from ideological tests.
- Publish and retract scientific papers on the basis of scientific, not ideological, arguments or due to public pressure.
- Require that universities enforce policies protecting academic freedom and freedom of expression, according to best practices promulgated by non-partisan free speech and academic freedom organizations, such as the Foundation for Individual Rights and Expression.
- Insist that university departments and professional societies refrain from issuing statements on social and political issues not relevant to their functioning, as recommended in the University of Chicago's Kalven Report.[146]

Although much has been written about DEI, the arguments advocating it fall into familiar categories: reparative justice is needed to redress historical discrimination; DEI is necessary to fight current discrimination; and DEI is needed to level the playing field and achieve equal outcomes.

With respect to reparative justice, affirmative action policies are ineffective, arguably unfair, and counterproductive. Although we see no role in science for identity-based policies, we recognize that the playing field is not level. Outreach in admissions and

hiring to candidates from less-advantaged backgrounds is important, not only to promote fairness, but to enlarge the pool of promising candidates. Schools and universities have a role to play in leveling the playing field by uplifting students who have come from more difficult life circumstances, not by imposing quotas or lowering academic standards, but by providing students with opportunities to develop the rigorous skills they need to enter scientific fields, and the support to do so. In this way, merit and diversity become synergistic rather than antagonistic.

Advocates of CSJ approaches to DEI often present the options as if it is either CSJ or bigotry. We reject this false dichotomy. Dismantling or disrupting institutional practices that have produced science's achievements, and replacing them with untested methods opposed to the Mertonian norms is a dangerous experiment that jeopardizes the future of science.

8. Conclusion

Imbuing science with ideology harms the scientific enterprise and leads to a loss of public trust. If we continue to undermine merit, our universities will become institutions of mediocrity rather than places of creativity and accomplishment, leading to the loss of the competitive edge in technology. Thus, we need to restore our commitment to practices grounded in epistemic humility and the meritocratic, liberal tradition.

We need to be vigilant against the dilution of our merit evaluations by biases, ideology, and nepotism. Moreover, as a community, we should continue to invest in mentoring and education to help people develop their full potential. Adopting the guidelines we have suggested does not mean that we ignore the contributions of past racism and sexism to the inequalities we observe today. It means addressing these issues in a fundamentally positive way—not by introducing diversity metrics into funding or hiring decisions, nor by weakening the standards for university admissions and professional advancement, but by investing in the early pipeline, for example, by strengthening educational outreach and programs to increase access to sustained quality education and early exposure to STEMM.

Scientists must start standing up for the integrity of their fields despite the risk of bullying and verbal attacks; donors and funders should condition their support on non-partisan and rational scientific pursuit. Science as a free pursuit of knowledge untainted by ideological orthodoxies maximally enhances the public good.

9. Afterword

Perhaps the grandest irony of them all, and the saddest commentary on the state of academia, is that this article, defending merit, could only be published in a journal devoted to airing "controversial" ideas.[147] As we were finalizing the manuscript for publication, the Office of Science and Technology Policy of the White House released a 14-page long vision statement outlining the priorities for the U.S. STEMM ecosystem.[148] The word "merit" appears nowhere in the document. In February, 2023, The National Academy of Sciences released a report titled "Advancing Antiracism, Diversity, Equity, and Inclusion in STEMM Organizations: Beyond Broadening Participation." The report describes merit as a non-objective, "culturally construed" concept used to hide bias and perpetuate privilege, refers to objectivity and meritocracy in STEMM as myths, and calls for merit-based metrics of evaluation to be dismantled.[149]

Supplementary Materials: The following are available online at https://journalofcontroversialideas.org/download/article/3/1/236/s1.

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