

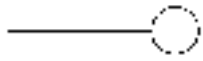
ISSUES IN SOCIETY

Series editor: Tim May

# The governance of science

democratization  
politics of science  
multiculturalism  
open society CHANGE  
intellectual property  
DIRECTION  
ACTIONS  
the university

● Steve Fuller



The governance  
of science



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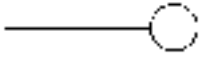
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The governance of science:  
ideology and the future  
of the open society



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## Series editor's foreword



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The social sciences contribute to a greater understanding of the dynamics of social life and to explanations for the workings of societies in general. They are often not given due credit for this role and much writing has been devoted to why this should be the case. At the same time, we are living in an age in which the role of science in society is being re-evaluated. This has led to both a defence of science as the disinterested pursuit of knowledge and an attack on science as nothing more than an institutionalized assertion of faith, with no greater claim to validity than mythology and folklore. These debates tend to generate more heat than light.

In the meantime, the social sciences, in order to remain vibrant and relevant, will reflect the changing nature of these public debates. In so doing, they provide mirrors upon which we can gaze in order to understand not only what we have been and what we are now, but also in order to inform ideas about what we might become. This is not simply about understanding the reasons people give for their actions in terms of the contexts in which they act, as well as analysing the relations of cause and effect in the social, political and economic spheres, but also concerns the hopes, wishes and aspirations that people, in their different cultural ways, hold.

In any society that claims to have democratic aspirations, these hopes and wishes are not for the social scientist to prescribe. For this to happen it would mean that the social sciences were able to predict human behaviour with certainty. One theory and one method, applicable to all times and places, would be required for this purpose. The physical sciences do not live up to such stringent criteria, while the conditions in societies which provided for this outcome, were it even possible, would be intolerable. Why? Because a necessary condition of human freedom is the ability to have acted otherwise and thus to imagine and practise different ways of organizing societies and living together.

It does not follow from the above that social scientists do not have a valued role to play, as is often assumed in ideological attacks upon their place and function within society. After all, in focusing upon what we have been and what we are now, what we might become is inevitably illuminated. Therefore, while it may not be the province of social scientists to predict our futures, they are, given not only their understandings and explanations, but equal positions as citizens, entitled to engage in public debates concerning future prospects.

This new international series was devised with this general ethos in mind. It seeks to offer students of the sciences, at all levels, a forum in which ideas and topics of interest are interrogated in terms of their importance for understanding key social issues. This is achieved through a connection between style, structure and context that aims to be both illuminating and challenging in terms of its evaluation of those issues, as well as representing an original contribution to the subject under discussion.

Given this underlying philosophy, the series will contain books on topics which are driven by substantive interests. This is not simply a reactive endeavour in terms of reflecting dominant social and political preoccupations, it is also proactive in terms of an examination of issues which relate to and inform the dynamics of social life and the structures of society that are often not part of public discourse. Thus, what is distinctive about this series is an interrogation of the assumed characteristics of our current epoch in relation to its consequences for the organization of society and social life, as well as its appropriate mode of study.

Each contribution will contain, for the purposes of general orientation, as opposed to rigid structure, three parts. First, an interrogation of the topic which is conducted in a manner that renders explicit core assumptions surrounding the issues and/or an examination of the consequences of historical trends for contemporary social practices. Second, a section which aims to 'bring alive' ideas and practices by considering the ways in which they directly inform the dynamics of social relations. A third section will then move on to make an original contribution to the topic. This will encompass possible future forms and content, likely directions for the study of the phenomena in question, or an original analysis of the topic itself. Of course, it might be a combination of all three.

In *The Governance of Science*, Steve Fuller steers a course between the two views on science that I alluded to in the first paragraph of this Foreword. He is neither 'pro' nor 'anti' science. At the same time he asks a simple, frequently neglected, but fundamental question: given that science seeks universal knowledge, how is it that so few 'unelected' practitioners may claim to speak in the name of all? While defining science as the systematic pursuit of such knowledge and so encompassing the social sciences, he takes the experimental sciences as the ideal to which all aspire. Yet in his interrogations, influenced by Karl Popper, science is not found to live up to such canons. However, this conclusion leads him to celebrate neither artificial negativity nor positivity.

Artificial negativity represents the type of thinking associated with the Frankfurt School of Social Research and elements of postmodernism that leads to a high level of abstract theorizing without engagement with the object of its attention. Artificial positivity, on the other hand, is representative of the work of those such as Thomas Kuhn, for whom the ideal of the open society is already present within scientific practices. Indeed, it may be argued that Kuhn's work was a catalyst for the earlier social studies of science in terms of being a means of reconciling the differences between C.P. Snow's now famous 'two cultures'. Nevertheless, the result of Kuhn's approach is to endorse the status quo as if that were representative of the open society. Therefore, these approaches, albeit in different ways, fail to engage with science policy and the malaise of scientific activities through prevailing economic conditions. The material basis for the realization of the republican ideal is thus left unexplored.

The author then moves on to argue that the conception and application of science should be open to democratic accountability for the purpose of enabling a greater understanding of the implications of scientific endeavours within the public domain. This necessitates a resort to normative arguments about the governance of science by way of an interrogation of Ebera and communitarian ideas. Finding both wanting, in the sense that they deny the 'right to be wrong', he argues for republicanism as representative of the ideal of the open society.

One of the central sites of the knowledge production process is the university. It is for this reason that Steve Fuller turns his attention to this institution in the second part of the book. Returning to the question of science claiming to speak for all in the pursuit of universal knowledge, it may be the bureaucratic status quo within universities that enables this endeavour. From this point of view multiculturalism represents a challenge as does what he terms the 'military-industrial metaphor'. This may be witnessed, for example, in terms of a tension between the instrumental and goal-orientated nature of knowledge production and that approach which regards knowledge production as a never-ending quest. Here, new recruits undertake apprenticeships in order to acquire the tools to produce yet more knowledge.

The university is thus a site of ambivalence: exemplified in the divide that they seek to bridge between their research and teaching activities, as well as between ways of knowing and the claims of particular academics to epistemic superiority based upon the status of the group to which they belong in general. This ambivalence is also manifest in the ways in which publishers increasingly dictate what can reach the public domain and between the pursuit of academic credibility via citation indices and the curiosity that must inform the scientific ethos in which, to paraphrase Bertrand Russell, one comes to recognize that the more one learns, the more one realizes how little one knows. Steve Fuller considers these issues with much insight and never hesitates to furnish the reader with a clear perspective on these important matters.

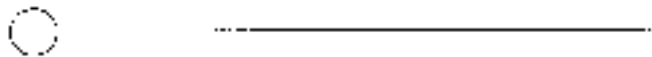
With the above in mind, Part 5 of this book is devoted to the secularization of science: that is, the deconsecration of state funding, along with the promotion of alternative programmes of research as contributions to the public understanding of science. In this discussion the author remains spiritual in his defence of an ideal, while never failing to engage with material reality. This is exemplified by the justification of a discovery being a consideration of the diversity of its applications. The claim to speak in the name of all is thereby tempered by how applications may be of benefit to different peoples. It is by virtue of such arguments that this book deserves a wide readership not only among scientists, but administrators, policymakers and the general public.

*Tim May*

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## Introduction



This book is my attempt to make science policy interesting and important to not only students of science but also students of democratic social and political theory. To be sure, there has been a long tradition critical of abuses of science, as defined by its technological applications. However, it has been much rarer to question the very constitution of 'science' as a polity. This is an issue that should be of interest to humanists, social scientists and natural scientists alike. Few doubt that the character of knowledge production has radically changed since the advent of the atomic bomb. Not only have physics and biology acquired a scaled-up industrial presence previously reserved for chemistry, but even certain lines of social science research now sport the forbidding technicality, spiralling research costs and cutthroat competition of 'Big Science'. Moreover, and most importantly, these developments are routinely seen – even by sociologists of science – as signs of *excellence* in the knowledge enterprise, perhaps even worthy of emulation throughout academia.

When I speak critically of 'science', I am generally referring to this normative orientation, which takes Big Science as the standard against which other forms of inquiry are judged and to which they are supposed to aspire. Invariably, institutional and intellectual aspects of 'science' are intertwined in this definition. The historic process of the natural sciences in explaining and legitimating socially significant phenomena is often taken to mean that research conducted under their rubric can do no wrong. In this book I aim to reverse this tendency by disentangling the intellectual core of science as organized inquiry from the other institutional roles it has added. However, I do this not to preserve an impossibly idealized version of inquiry, but rather to articulate the material conditions under which the admirable features of science – especially those relating to its critical vision – have been both realized and perverted. In short, to adapt Harold Lasswell's famous

definition of politics: in the republic of science, who should be doing what, with what means and to what ends? These are the questions that the book before you addresses.

Many of the ideas that went into composing this book were conceived in the early 1990s, often as a follow-up to my 'Social epistemology and the research agenda of science studies' (in Pickering 1992). Presupposed in much of the discussion is the importance of rhetoric in breaking down disciplinary and other social barriers that prevent full participation in the science policy process. This point is explicitly developed in my earlier book, *Philosophy, Rhetoric, and the End of Knowledge* (Fuller 1983a). Two other books written in roughly the same period should be consulted for the larger historical and philosophical vision that informs my general orientation: *Science* (Fuller 1997) and *Thomas Kuhn. A Philosophical History for Our Times* (Fuller forthcoming).

The event that galvanized my interest in treating the governance of science in some depth was the termination of public funding for the Superconducting Supercollider, which, if built, would have been the world's largest particle accelerator. According to its proponents, this machine would have been capable of revealing the ultimate nature of matter and motion, thereby providing the key for unlocking the great mysteries of the physical universe. In its 1992-3 session, the US Congress deemed that the project failed to meet the benefit-to-cost challenge in a tight budgetary regime. The protracted and highly publicized debate over the Supercollider drew attention to factional division within the physics community, the historical shallowness of 'cultural' arguments for science funding and the diminished political significance assigned to basic research in the post-cold war era.

The demise of the Supercollider also marked the first time that scientists openly declared that science and technology studies (STS) – the interdisciplinary field that studies the social production of scientific knowledge – was instrumental in promoting public disaffection with science. Noteworthy in this vein was Steven Weinberg's *Dreams of a Final Theory* (1992), which is also fairly regarded as one of the opening salvos in the ongoing 'science wars'. Readers may judge for themselves the justice of the charge against STS in the pages that follow, as I have been actively promoting the field for over ten years, in connection with my own research programme of 'social epistemology'. All I would say at this point is that one person's 'funding cut' is another's 'resource reallocation': in normative disputes, point of view is almost everything.

In keeping with the format of books in the 'Issues in Society' series, this one is divided into three parts. Part 1 presents the conceptual framework, which is drawn mostly from normative political theory. Here I explain the republican ideal of science as the 'open society' and science's failure to live up to this ideal as its scale and scope have expanded. However, in this respect, the problems of 'Big Science' are not much different from those facing 'Big Democracy'. In Part 2, I focus the discussion on the most concrete site for the governance of science, the university. The coherence

of this institution is increasingly challenged by multiculturalism and capitalism, which can be seen as representing the opposing pulls of communitarian and liberal ideologies introduced in Part 1. Part 2 presents the prospects for the future governance of science, which I see in terms of a continuation of the process of 'secularization' that decouples state power from the authorization of knowledge claims. I consider both historical precedents and experimental proposals for this process, which together offer the alternatives for renegotiating science's social contract.

Readers will find the references wide ranging. However, those wishing a broader overview of the 'essential tension' between science and democracy in American political thought should consult *Social Epistemology*, 7(1) (1995), which is a symposium around a piece by David Guston. On the tensions surrounding the contemporary university as a site of knowledge production, readers are directed to *Social Epistemology*, 7(1) (1998), which centres on an article by Gerard DeMartij. Finally, readers should note that despite periodic allusions to the commodification of expertise, information technology and intellectual property, I have not used this occasion to collect together my ten years' worth of writings in what I now call 'the sociology of virtual knowledge'. Fuller (1998) represents my most recent thinking on this topic and includes a bibliography that will form the basis of a book in the near future.

There have been many occasions for presenting the material contained in these pages, including my inaugural lecture as Professor of Sociology at Durham University (30 November 1995), where I introduced the idea of 'secularizing' science discussed in Part 3 and in Fuller (1997: Ch. 4). Among those who made these occasions possible were J. Anthony Blair, Roy Boyatz, Richard Harvey Brown, Jim Callier, Bill Dana, Jean Leaca, Jan Nederveen Pieterse, Zia Sardar and Ullica Segerstrale. I would also like to thank Amitai Etzioni and Alf Lawrie who helped clarify my ideas about republicanism and 'the right to be wrong'. Tim May deserves the credit for persuading me to write this book and for reading through the entire manuscript with a sharp editorial eye. Many of the ideas discussed in these pages were born of discussions with Sujatha Ramani. However, my biggest debt during the 4-Tenah period this book was written is to Stephanie Lawler, who was an unflinching source of emotional support.





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## PART ONE

### The political and material conditions of scientific inquiry

The pursuit of knowledge, 'science' for short, has undergone significant material changes over the past century, probably more so than at any other point in its history. Yet, the political rhetoric surrounding science – especially the ideology of the open society – remains largely unchanged. In the first two chapters of this book, we uncover what is masked by the continued use of this rhetoric. The discussion in Chapter 1 is framed by three political theories of science: liberalism, communitarianism and republicanism. The open society is possible only in a republican regime, where, unlike liberal or communitarian regimes, a clear distinction is drawn between staking an idea and staking a life. This distinction underwrites the fundamental principle of the open society: the right to be wrong. Chapter 2 moves from defining this ground to showing how it has come to be eroded with the scaling-up of the scientific enterprise into what is nowadays routinely called 'Big Science'. Today too many other things seem to be bound up with the organized pursuit of inquiry to enable it to function in the critical capacity demanded by the idea of the open society. Part 1 ends with a rejection of 'science literacy' as a strategy for opening up science to the public: at best, it secures a receptive attitude without provision for greater public participation. However, the current popularity of science literacy campaigns reveals the extent to which the central political issues facing science are treated as a matter of remedying certain 'cognitive' deficits suffered by the public.





## Science as the open society and its ideological deformations



### Introduction: the artifice of science as the open society

Most of the debilitating effects of political regimes come from people feeling they cannot either admit their own errors or reveal the errors of others – that is, unless the errors are minor ones. (Postmodernists who balk at talk of ‘error’ should ask instead about the capacity to change one’s own and others’ minds in public.) Of course, those who propose claims about the errors of others may themselves be in error. However, for most of history (including the present), people have been afraid even to speak in terms of their own or others’ ‘errors’ because of what they fear to be the consequences of such talk. The result is that a self-imposed authoritarianism can remain in force even in avowedly liberal and communitarian societies – the two major philosophies in the western political tradition. The former finds the prospect of errors too risky to bear individually, whereas the latter portrays the admission of error as the betrayal of duty to the collective. In both cases, people lose their ‘right to be wrong’, which is the essence of the open society, the ideal projected by the elusive middle ground of political theory known as *republicanism* (Petit 1997).

In the pages that follow, I treat the governance of science as a branch of normative political theory, so that all of the above terms and issues are made central to an understanding of the people, processes and products associated with ‘science’. By ‘science’ I normally mean the systematic pursuit of knowledge, in the German sense of *Wissenschaft*, which includes all the academic disciplines, not just the natural sciences. The famous precedent for this usage is Max Weber’s (1978) address to new sociology graduate students, ‘Science as a vocation’, which I shall revisit in Chapter 5. However, in the twentieth century, the experimental natural sciences have increasingly become the paradigm case of ‘science’, the standard against

which other academic disciplines and even non-academic social practices are evaluated (Fuller 1999: Ch. 3). We shall see that often this standard is regarded so uncritically that less than ideal knowledge practices in the natural sciences are simply assumed to be normatively acceptable. For that reason, we need at the outset a clear normative vision that can be questioned independently of its alleged exemplification; hence, the appeal to political theory, and more specifically republicanism.

Why call this topic the 'governance of science' rather than, say, the 'politics of science'? Often the latter expression refers to science's entanglement with the larger – invariably conflicted – interests in society, typically in matters of technology that have serious impacts on individuals' lives, the environment and/or the economy. In those contexts, science is treated as an instrument that can be used for good or ill, but little attention is paid to the constitution of scientific knowledge itself or the people who produce it. The 'governance of science' is meant to cover this relatively neglected set of concerns. I say 'governance' instead of 'government' because, seen from a political standpoint, the accountability relations in science – the analogues of elections, referenda, trials and audits – are remarkably informal. (For more on the theory of governance, see Power 1997.) Strictly speaking, science is a representative body in which a few speak for the many. Were this not literally true, then science's claim to 'universal knowledge' would lose its meaning, given that not everyone can be involved in scientific inquiry at any given moment. Yet there is no parliament of scientists, and the days are long gone when academics were granted special voting privileges in national assemblies.

More to the point, scientists are not elected by the populace, or even a representative sample of the populace. Rather, they are 'self-selected', which means that people who are already scientists – and relatively few of those – decide who is fit to hold the title of 'scientist', through examination and publication policies that proceed with little external scrutiny. Therefore, the mystery surrounding science as a political concept lies less in its day-to-day business (i.e. 'research') than in its capacity to speak on behalf of the whole of humanity in a way that transcends national differences as well as other cultural and economic barriers. In that sense, science is a vehicle of global governance. This point is most readily seen in the efforts taken to standardize the public provision of education and health around the world. That science both governs and is governed without being formally constituted as a government implies a paradox. Scientific authority is currently founded on a principle of 'mutually tolerable ignorance' while the public understands little of the science it believes, scientists often have no first-hand knowledge of the experiences over which they pronounce.

On the one hand, the public trusts, or at least defers to, scientists, though few non-scientists have ever witnessed how scientists come up with the knowledge on which their judgements and explanations are based, and not many more can recite the catechism presented in science textbooks (Durant et al. 1989). People seem to live quite comfortably believing in Newton's

theory of gravity or Darwin's theory of evolution, even though they are incapable of saying what the theory is or even what does and does not follow from it. Indeed, many philosophers nowadays regard this attitude as a sound epistemic strategy (Goldman 1999). On the other hand, the phenomena that scientists are authorized to judge and explain on the public's behalf typically have been experienced more directly by ordinary members of the public than by the scientists themselves. Thus, we find white, male medical scientists authorized to speak on biological topics ranging from childbirth practices to 'genetic planning', not to mention straight middle-class biochemists and psychiatrists explaining drug taking and homosexuality. Very few, if any, religions have commanded such blind loyalty on the basis of such little mutual personal understanding between the speakers and the spoken for and about. The reason, of course, is that most religions include a pastoral mission that involves the flock in mastering a watered-down mythical version of orthodox theology and the ministry in regular contact with the spiritual and sometimes even physical needs of its flock. The constitution of science is remarkable in lacking any sense of pastoral mission or, in more secular terms, party politics.

It is also worth recalling a more conventional sense in which the constitution of science has political implications. Consider *The End of History and the Last Man*, where Francis Fukuyama (1992) declared that a liberal democratic future awaited all the world's peoples, courtesy of capitalism's systemic beneficence. Fukuyama was one with his Marxist opponents in pointing to the 'logic of natural science' as plotting an inevitable course that both transcends and transforms even the most historically entrenched of cultural differences. In that sense, science puts an end to history: once the natural trajectory of science is appropriately harnessed to the form of our society, history then simply consists of the rest of the world catching up by repeating the steps originally taken by that society. Until quite recently, this was how both capitalists and socialists in the first two 'Worlds' thought that the Third World would be 'modernized'. Socialists paraded to science's role in the creation of labour-saving technologies that eventually undermine the basis for any sharp distinction between the workers and their bosses. For their part, capitalists emphasized the role of science in enhancing people's innovative capacities and hence their ability to compete more effectively in the market-place. The roles assigned to science in the two political economies were different, but both were meant to have globally liberating consequences. Indeed, sometimes it seemed that 'science' was little more than the name given to the putative source of whatever progress the history of politics or economics was said to display.

Thomas Kuhn had a characteristically equivocal way of capturing accounts of science that straddle a description of its actual conduct and the standard it sets for the rest of society. Kuhn professed an interest in accounting for science 'when it functions as it should' (cf. Kuhn 1970: 237). Tactfully omitted from this aspiration was any judgement about how often, if ever, science lives up to its own standards of rationality and objectivity, the

standards that then provide the normative basis for the 'knowledge-based societies' in which we allegedly live today (Stehr 1994). Consequently, Kuhn, like so many other social theorists of science, suspends his account of science in what may be called a state of 'artificial positivity', i.e. the (dubious) assumption that the clarity with which 'science' can be articulated as a normative ideal is indicative of the ideal's realizability in today's world. Let me briefly explain this concept, as it will suggest the distance between most current thinking about science and the mindset needed to address the governance of science properly.

The concept of artificial positivity is modelled on 'artificial negativity', an expression associated with the arch scepticism of the Frankfurt School's version of critical theory, which saw capitalist complicity in every form of cultural production. Such conspiracy theorizing, albeit conducted at a very high level of abstraction, ends up winning intellectual battles while losing the political war, since it involves the critic's withdrawal from the public sphere, lest the critic be sullied by capitalist conspirators by prematurely endorsing reformist measures (Geuss 1999: Ch. 4). In my usage, 'artificial positivity' represents the complementary attitude that there is nothing for the critic to do because the ideal is already presupposed in everyday practice. In that case, any perceived discrepancies between the ideal and the real are treated as localized incidents, the remediation of which will occur in the long run, either because the system naturally corrects itself or people come to see the discrepancies as systemic virtues in disguise. Sometimes this attitude is cloaked in philosophical high-mindedness. Ironically, the man who has done the most to debunk the wishful thinking that normally passes for such high-mindedness, Theodor Adorno, passed down the Frankfurt School's legacy to someone who has increasingly displayed just that attitude, Juergen Habermas (Fusfield 1997).

Normative visions of science as the 'open society' are typically subject to artificial positivity in this sense, the result being a blatant endorsement of the status quo. For example, the fact that many cases of research fraud are eventually caught by the scientific community is taken to vindicate the self-critical function of science, not to signify a deeper, more systemic problem with the conduct of scientific research. Also, the fact that science displays a pecking order of researchers, institutions and even subject areas that rivals that of any class-based society is presumed to be the desired outcome of processes involving the free and open participation of all members of the scientific community. The fact that these processes cannot be easily specified and that many scientists are clearly dissatisfied with their place in the pecking order are treated as areas 'in need of further empirical investigation', not indirect proof of the artificially positive assumptions made about the realizability of the open society in science today.

Perhaps the most thorough recent defence of a vision of science in this artificially positive mode is Cole (1992), who may be uncharitably read as arguing that everyone who deserves recognition in science eventually gets it – including women and minorities. However, characteristic of this kind

of research, Cole considered only scientists who actually managed to place publications in the leading journals of their fields. He might have told a different story had he considered the number of inquirers who dropped out even before reaching that stage of minimal scientific recognition. Nevertheless, over the past quarter-century, Cole has been one of the most widely consulted sociologists by the US National Science Foundation on science policy decision making.

In light of the above, it is no surprise that the arch sceptics of our own time, the postmodernists, have rejected the open society ideal of science as just so much wish-fulfilment. Nevertheless, the ideal remains sufficiently alive in policy circles and is sufficiently admirable on its own terms to deserve a rearticulation, one that deals squarely with the political and economic conditions that are necessary for its realization. This project goes very much to the heart of my own programme of social epistemology. When I began this programme, just over a decade ago, I wanted to lay the foundations of a sort of welfare economics of science, or 'knowledge policy' (Fuller 1988: 289, 1993b, 1997). While this still captures my general normative sensibility, it has become increasingly clear that the political implications of my work vacillate between liberalism and socialism, roughly depending on whether I have drawn my disciplinary resources from the humanities or the social sciences, respectively. However, implicit throughout has been a commitment to the republican values associated with Karl Popper's (1945) original popularization of the open society.

### **Republicanism as the political philosophy of an open science**

The history of science can be told as a narrative of successive reconstitutions of the scientific polity: i.e. changing definitions of the rights and obligations of both scientific inquirers and the societies housing them. Republicanism represents the ideal state, in that it allows people to speak their mind with impunity. However, this is possible only under specific social and material conditions. When Michael Polanyi (1962) famously articulated the 'republic of science' as an ideal in the 1950s, he crucially failed to specify the relevant background conditions needed to realize this ideal. Specifically, there are communitarian and liberal 'excesses' between which a republican science would need to navigate. However, as we shall see, both are mediated by economic conditions.

### **Communitarian excess**

If scientific utterances carry too much *prima facie* authority in the large society, then it is easy to see how 'political correctness' might emerge as a countervailing response, especially in communitarian societies where matters of group identity are paramount. For example, because scientific studies that purport to prove the cognitive inferiority of blacks can all too easily



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