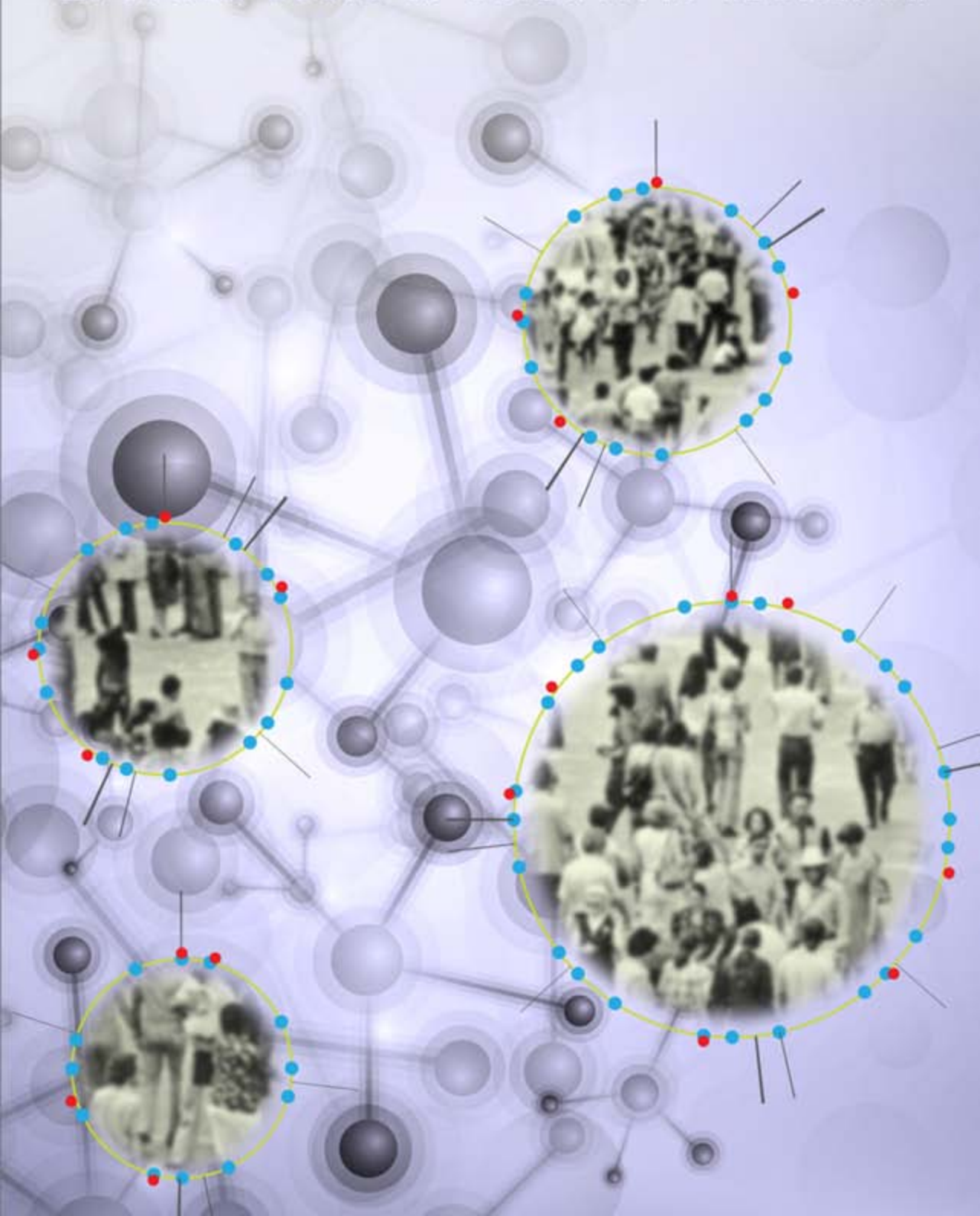


SANDRA HARDING

Objectivity & Diversity

ANOTHER LOGIC OF SCIENTIFIC RESEARCH



Objectivity and Diversity

**Objectivity and Diversity
Another Logic of Scientific Research**

Sandra Harding

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Preface

Worries about objectivity just won't go away. Issues about what should be the role, if any, of values and interests in scientific research are as old as Galileo and the Enlightenment, and as new as the recent public debates about stem cell research, women's math and science abilities, intelligent design, poor people's high birthrates, and the causes of climate change.

In many cases, of course, the invocation of "objectivity" for a knowledge claim has more to do with attempts to boost the status of the claim than with any actual criteria the claim has satisfied, as philosopher Ian Hacking (forthcoming) points out. "Objectivity" is just an "elevator word" and we should all please refrain from using it, he argues. While Hacking is undoubtedly right about the proliferation of substantively meaningless claims to objectivity, I think the term remains far too powerful simply to abandon to such boosters. Moreover, there remain ways in which the term has not worn out its usefulness in spite of its overuse as an elevator word. This study pursues such possibilities.

Continued concern with the term "objectivity" and what it could stand for testifies to the fact that objectivity is good to think with, to borrow a phrase from anthropology. It is invoked at the juncture of a number of current anxieties and debates about relationships between rapidly

transforming societies, multiplying sciences, and increasingly powerful technologies that seem impossible to control as they permeate more and more of our daily lives. This can be a good reason to keep the term in focus. Yet the term itself has never referred to a single idea. Historian Peter Novick (1988) showed that objectivity “is not a single idea, but rather a sprawling collection of assumptions, attitudes, aspirations, and antipathies. At best it is what the philosopher W. B. Gallie has called an essentially contested concept, like social justice or leading a Christian life, the exact meaning of which will always be in dispute.” Robert Proctor (1991) pointed out that the correlate of objectivity, value-neutrality, also has been used as “myth, mask, shield, and sword” (262). Sometimes it is used to advance democratic agendas, and at other times to block them. Sometimes it is used to increase the growth of knowledge, and at other times to restrict knowledge.

A central set of concerns with the objectivity and value-freedom of research today is about the fairness and responsibilities of researchers and their philosophies of research. Is a particular piece of research, or a favored way of doing research, maximally fair and responsible to the data and to the severest criticism it does and could receive? Have the fears, desires, and interests of the most economically and politically vulnerable groups been considered? How will the lives of people in those groups be affected by a particular piece of research, should it come to direct policy—and do those people have a say in whether and how the research will be done?

Such questions already raise issues about how science is and should be defined. The term is primarily a modern Western one, and its use is relatively recent. Galileo and Newton were practicing “natural philosophy,” in the eyes of their peers. The term “scientist” only began to appear in the mid-nineteenth century, with William Whewell’s (1840) usage. Yet since the emergence of logical empiricism (or logical positivism) in the middle of the twentieth century, each of the various criteria proposed for distinguishing modern Western science from other knowledge-seeing practices has slowly but surely withered away. Philosophers have wanted to keep distinct Science—that is, modern Western science—from all other knowledge systems, here referred to as “sciences.” A distinctive method (induction, deduction), a critical attitude toward traditional belief, a distinctive language (mathematics, observation sentences), a distinctive metaphysics (disenchanted, secular, material, primary and secondary properties), and a distinctive epistemology (justified true belief)—such proposed criteria for distinguishing Science from science have all withered away under the rigorous critical scrutiny

of philosophers, historians, sociologists, and ethnographers of science as well as scientists themselves. Each of the proffered criteria did indeed identify an important element of the advance of scientific knowledge proposed at particular historical moments. But it did not do so at other times.

Moreover, some of these supposedly distinctive features do in fact characterize the practices of many knowers who are not permitted to sit next to scientists at their lab benches. After all, dogs, cats, and even my chickens practice induction and deduction! What about indigenous knowledge? It is often empirically reliable, yet it lacks features desired in modern Western science. Should it be permitted to count as “real” science? On the other hand, how can claims for creationism and intelligent design be disallowed as sciences if there are no firm definitional standards for what should count as “real” science? What about Islamic science and Hindu science, both currently promoted by particular cultural groups?

Then we come to “diversity.” What is the diversity on which I focus here? As indicated above, one central concern is to include in scientific decision making the groups that heretofore have been excluded from participating in decisions about research that has effects on their lives. After all, it is a basic premise of democratic ethics that those who bear the consequences of decisions should have a proportionate share in making them (with exceptions for those not fully competent to do so—another contested issue). As we shall see, many forms of participatory science have appeared. There are “civic science” and “citizen science” in both social and natural sciences. Participatory action research in the social sciences had already emerged by the middle of the twentieth century. Radical forms of collaborative science have taken hold recently in research with indigenous communities. Yet at issue in the objectivity debates is more than who actively participates in making scientific decisions. At issue is also the question of whose agendas science does and should pursue. Whose hypotheses, concepts, preferred research designs, and preferred understandings of nature, social relations, and inquiry should be supported in multicultural democracies? And how does participation in such decision making, especially in public discussions, change both the participants and the styles of decision making? Thus the diversity desired is not that of mere physical presence, as conventional liberal politics often assumes, though to value the physical presence of all groups is an important first step. Rather, what is desired is the kind of diversity that fully respects the values and interests of all citizens while protecting those of the most economically and politically vulnerable groups.

The question of how to do research that serves pro-democratic ends directs attention to methodological issues. Alan Megill (1992) pointed out that those who were concerned with advancing objectivity tended to focus on one or another of four different components of research. Some focused on which kinds of people should be presumed to be most objective: not women, poor people, African Americans, and so on? Some focused on the results of research: were the knowledge claims objective? But here it is hard to see what focusing on objectivity adds to assessments of the truth, “verisimilitude,” reliability, or predictive power of research results. A third concern has been with scientific communities. These communities must have certain ideals, standards, and practices in order to do the necessary hard critical engagement with each other’s work, and yet they must also stay committed to tedious and difficult research processes over long periods of time and often under extremely adverse conditions. Think of Arctic or Amazon explorers, manned space science today, or even the normal laboratory research examined by Bruno Latour and Steve Woolgar (1979). Thomas Kuhn’s (1962) influential study brought this conventional sociological concern into philosophic considerations (Hollinger 1996). Finally, it is method and methodology upon which practicing scientists focus their concerns to “operationalize” the demand to maximize their objectivity. And that will be my primary focus here. The social justice movements have argued that there must be something wrong with even the very best scientific methodology, since it seems to have lacked the resources to block discriminatory values and interests from shaping some of what is generally regarded as the very best research.

Standpoint methodology and its “strong objectivity” standard have become one of the most widely used approaches for research in such social movements (chapter 2). The immense influence of standpoint approaches has been primarily due to their ability to turn an epistemic and political agenda into an easily understandable research methodology. An insightful critical analysis is crucial to understanding how power shapes knowledge production, as many critics of modern Western sciences have argued. But how can the culture-wide influence of such power and knowledge positions be countered? Start thinking about research on nature and social relations from the standpoint of the everyday lives of an oppressed group, say the social justice movements (Harding 2004). This directive showed researchers how to select hypotheses and how to design research that in itself served both the advance of knowledge and the promotion of social justice; the two goals were linked, they argued. Philosopher Sarah Richardson (2010) has documented how from its first

appearance feminist philosophy of science was recognized to have developed powerful resources to justify the legitimacy of feminist research and the field of women's studies and to challenge basic assumptions in institutions of research and higher education. It is its distinctive research methodology, I would argue, that has played an important role in enabling such effects. Recollect that it was just that kind of linkage between public understanding and new research methods that gave such moral and political energy to modern Western scientific method in Galileo's day. "Anyone can see through my telescope," Galileo said; legitimate knowledge of the heavens need not depend upon the authority of the Roman Catholic Church or of aristocracies and monarchies. Rather, the new scientific method gave the least privileged groups the power to testify to the existence of the rings of Jupiter or mountains on the moon. My point is that pro-democratic transformations of the social order and of favored scientific methodologies have co-produced each other a number of times in history.

I have two strategies here that are intended to invigorate new questions about the tired old topics of objectivity and diversity. One is to consider some particularly surprising cases of how social values and interests have shaped science. Appreciation of these cases encourages rethinking of the strengths and limitations of the logical positivist legacy while still advancing the intellectual and political research goals of social justice communities. The other strategy is to try to locate the issues here in their historical contexts. Understandings of science and its philosophies in the world of the mid-twentieth century turn out to be no longer entirely appropriate or helpful in the very different world of today.

Thus, chapter 1 situates today's still dominant analytic philosophy of science in the context of social transformations over these recent decades: the optimistic era of modernization theory and its development projects at the end of World War II and the beginnings of the Cold War; the rise of social justice movements in the 1960s; recognition of the failures of development policies by 1970, and the early flourishing of globalization; the end of the Cold War in 1989; and, finally, today's world, in which these earlier transformations have ripened and intersected in challenging new ways, and a wave of new social justice movements has taken hold around the globe. Chapter 2 examines the "strong objectivity" demanded by social justice movements: that all sciences become "sciences from below."

Chapters 3 through 6 take up ways in which recently emergent issues about science and society can be used to take a fresh look at discussions about how to depart from positivism without throwing away

the valuable “baby” of standards for reliable research along with the “bathwater” of earlier formulations of the requirements for objectivity. Chapter 3 shows how starting research from the daily lives of poor women in the developing world can provide reliable facts and missing explanations about just why development policies have failed to eliminate poverty. Chapter 4 looks at one central issue in postcolonial science and technology studies: the reevaluation of indigenous knowledge systems as often being reliable and valuable, both to the indigenes and to the rest of us. These knowledge systems are always embedded in their distinctive cultural legacies and projects, and Westerners still today tend to see them as insufficient to qualify them as “real science.” Chapter 5 “returns home” to examine recent reports of a very different history of the philosophy of science than was earlier visible. It turns out that logical positivism (analytic philosophy’s logical empiricism) gained its familiar distinctive commitments to the autonomy, value-freedom, and unity of scientific research in political resistance to McCarthyism and the Cold War in the United States during the 1950s.

Chapter 6 critically examines the nature and effects of the secularism in which modern Western sciences are so heavily invested. It turns out that not only religion but also secularism has been a specific cultural force in the history of modern Western sciences: this secularism has been identifiably Christian. Moreover, this issue has distinctive gender implications. The concluding chapter points to three new notions of a “proper scientific self” that are demanded by the new “sciences from below.”

We turn next to the series of social transformations that generated demands for new kinds of sciences and philosophies in the last half of the twentieth century.

1

New Citizens, New Societies: New Sciences, New Philosophies?

Locating Philosophy of Science in Global History

Central assumptions of the philosophy of science that most of us learned in graduate schools in the United States were grounded in the modernization theory of the late nineteenth century. This philosophy was reshaped into its late twentieth century form with the revival of this theory at the end of World War II. This was the era of the founding of the United Nations and its development agencies which were to bring modernization to Third World countries, and of the start of the Cold War. Western leaders conceptualized scientific rationality and technical expertise as the “motors” of development policies and their modernizing practices. Without their dissemination, modernization could not occur. And without modernization, the world’s poor could not attain a better standard of living. Continuing poverty would again cause just the kinds of social unrest that had created the atrocities of World War II. Only now, the availability of nuclear armaments promised even more unimaginable death and destruction.

The conceptions of the regulative ideals of scientific research embedded in this philosophy were crucial to modernization theory. Value-free objectivity, rationality, and good research method were three such central ideals. They also turned out to be valuable commitments for scientists

and philosophers who found themselves working in the contexts of McCarthyism and the Cold War. This was especially so for the scientists and philosophers who happened to be socialists or Jews.

That philosophy of science, referred to as logical empiricism or logical positivism, is still the dominant one today. It is invoked not only in philosophy departments but also in the natural and social sciences. It is used to police academic programs of study and public testimony and debates about, for example, climate change, the eradication of poverty, and the legitimacy of teaching creationism and intelligent design to high school students. Yet the way in which the ideal of objectivity is talked about on campuses and in public debates is at odds with the actual histories and present practices of the sciences and their philosophies. Sciences and their philosophies have never been value-free. They have always been deeply integrated with their particular social and historical contexts. If they weren't, they would be irrelevant. Some critics would say that this is precisely the point: contemporary logical empiricist philosophy of science has become irrelevant not only to how science is sponsored, funded, and practiced, but also to the challenges that publics face in deliberating about its role in public life. What is going on here?

The world we live in today is not that of the middle of the last century. Today, skepticism about modernization theory and the adequacy of its philosophies of science has been appearing in numerous places around the globe, though many philosophy departments as well as development agencies seem unable to envision how to move forward. Moreover, something is happening in national and international politics that seems to promise deep and vast changes in the global social orders in which Western philosophies of science have played a significant role. The outcomes of these changes are not yet clearly visible. Yet, as I write this paragraph, many thousands of Brazilian citizens, especially young people, have been peacefully protesting in the capital of Brazil and in many other cities around the country. The protest started with resistance to a threatened increase in bus fares. For students and the poor, the increase would bring the cost of travel to school and their jobs up to one-quarter of their incomes. But the protest quickly expanded to rage at the decision of the government to spend the Brazilian equivalent of many hundreds of millions of dollars on a new stadium for the 2014 World Cup soccer tournament rather than on the health, education, and other social services badly needed by so many citizens. Now the president of Brazil has announced that funding for the stadiums will not cause cuts in social services. But the protesters are unlikely to be satisfied with this attempt at damage control. It is the government's refusal to prioritize

their basic human needs that is the issue. Their basic human rights are being violated, many argue. Their work and taxes support their society's daily life and provide the funding planned for the soccer stadium. Why should they have to continue to live in such immiserated servitude in such a wealthy country?

Meanwhile, in Istanbul, Ankara, and other cities in Turkey, massive popular protests against the autocratic management practices of the country's president have developed in opposition to his harsh crack-down on initial protests against the transformation of a major public park in Istanbul into expensive private housing and a shopping mall. Here, too, an initially sharply focused resistance to removing resources for poor people has expanded into a nationwide protest against government decisions in which participation has been denied both for poor people and for the many better-off citizens who support the concerns of the poor.

And both of these social movements claim inspiration from the "Arab Spring" of 2011. In those uprisings, citizens in Tunisia, Libya, Egypt, and other Middle Eastern and North African countries rose up against what they saw as autocratic regimes of elites who were more interested in enriching themselves and the greedy needs of the United States and other Western governments than in improving the lot of the vast majority of their citizens who remain politically and economically vulnerable. How much longer will the oil-rich Gulf state monarchies manage to resist such democratizing tendencies? Nor are such protests rising only "out there" in distant parts of the world. Our own "Occupy Wall Street" movement protested that the United States government was willing to "bail out Wall Street" but not "Main Street" in the financial crisis of 2008. Around the globe, those left out of modernization plans are demanding an end to social progress for elites only.¹ They want modernization agendas that serve their interests and desires.

Are these kinds of events relevant to philosophies of science? It might not initially be obvious how they are. Certainly our logical empiricist philosophies don't give us clues to how to think about such a question. Yet I hope to show that the current agendas of modern Western sciences and technologies and their Enlightenment diagnoses of how to advance social progress are very much at issue in such events. The end of Western colonialism, the fall of the Soviet Union, the onset of globalization and the "information age" (Castells 1996ff), and the rise of people's movements around the globe all suggest the necessity of relocating our thinking about Western philosophy of science out of the cheery Enlightenment world of the "logic of scientific discovery" (Popper 1959), where

it took up residence in our classes and public debates decades ago, and onto current geopolitical maps where it continues to have powerful effects. All too often, unfortunately, these effects work against the stirrings of progressive social movements around the globe.

It must be noted that all of these recent uprisings have been dependent on the resources that globalization and its electronic and media marvels—cell phones, the internet—provide for the organization and management of social change. None are Luddite movements that advocate smashing these technologies of modernity, though most of them have at best an uneasy relation with the continually improving military technologies that scientific rationality and technical expertise deliver. But they do want a say in transforming the conventional philosophy of science and its blind allegiance to elite social projects into philosophies that actually serve their interests and desires for social progress. They want a kind of epistemic modernization, as sociologist David Hess (2007) has put the point, that conventional modernization theory and its philosophy of science have not had the resources to deliver.

The more than six decades of local and global history that have made this a different world are rarely perceived within mainstream philosophy of science as providing reasons to rethink older factual or normative assumptions about nature, scientific inquiry, or the social contexts in which science exists. “The social” tends to be perceived by philosophers and scientists as a source of obstacles and problems rather than as a generator of resources and promising new pathways (cf. Schmaus 2005). Shouldn’t philosophies of science ponder how their priorities, ideals, and practices align, or not, with the kinds of global historical tendencies that are indicated above? Do Cold War residues in this philosophy block recognition of how institutional changes in the production of scientific research tend to align with particular kinds of philosophic positions, some of which are more attractive and some less so to advocates of more democratic social relations? Has this once-so-progressive philosophy somehow ended up today as a mostly economically and politically conservative force that has lost its alignment with democratic social movements? Such alignments, from Galileo’s day to the Vienna Circle of the 1930s and early 1940s, have rightly been regarded as what has entitled science to such high public regard and to massive support by taxpayers. After all, why should those with commitment to democratic social relations want to support sciences that can produce highly reliable results of research but are funded to do so primarily in response to the concerns of militarism, corporate greed, and the “investing classes” in the Global North and their allies around the globe? Why should reasonable people

take this research to be “value-free?” Is the scientific research on which philosophers focus being done on Mars or in some kind of monastic fortress mostly isolated from the last six decades of economic, political, and social change in the West and around the globe? These are the questions that motivate this study.

The field of the social studies of science and technology can provide assistance here. The sociology, social history, ethnography, politics, and economics of the production of “true belief,” not just of errors, began to emerge in the 1960s. The work of historian Thomas S. Kuhn (1962) and philosopher Paul Feyerabend (1975) brought forth intense criticisms in the 1970s (e.g., Lakatos and Musgrave 1970). The subsequent development of this work seems to have occasioned scattered rebukes and occasional slight outreaches, but little sustained engagement from mainstream philosophers. By the 1970s, feminist approaches to the social studies of science and technology began to emerge, and then postcolonial studies began to take on science and technology issues in the 1980s, though each of these latter two schools of science studies had older roots.

These three fields have produced histories of modern Western sciences and their philosophies that are counter to the standard ones provided in science and philosophy of science texts. They show the “integrity” of the great achievements of the sciences with particular aspects of their historical eras, as Kuhn (1970, p. 3) put the point. Standards for objectivity, rationality, and good method are often the targets of their critical accounts. In light of these accounts of how sciences and their social contexts shape each other, must our philosophies abandon regulatory ideals of scientific research such as objectivity, rationality, and uniquely good method? Or can there still be an important role for such standards in these new relations between sciences, their philosophies, and their social orders?

The project of this book will be to show that objectivity and certain kinds of diversity can be mutually supportive. While this mutual support claim is counter to the assumptions of the philosophy of science developed in the United States after World War II, it might well be seen as a continuation of the central insights of the Vienna Circle, as chapter 5 will discuss. The strategy here to make the claim compelling is to do “bridge work” between recent feminist, postcolonial, and post-Kuhnian science studies thinking.

The next two sections of this chapter look at the social conditions for scientific research and its philosophy that were created in two eras of significant institutional change: the postwar era of the 1940s and ’50s, and then the failure of Third World development policies, the rise of

anti-authoritarian social movements, and the emergence of globalization in the 1960s and '70s. The fourth section describes briefly the three science studies research fields that started up in the 1960s, '70s, and '80s. The concluding section identifies six arguments for the mutual support claim to be developed in the following chapters.

Post–World War II: Philosophies of Science for Prosperity and Peace

The end of World War II ushered in an optimistic era for the winners of the war as well as for at least some of the populations around the globe who began to emerge from colonial rule. There would be a “peace dividend” for countries that had financially supported the war efforts. Moreover, the Marshall Plan for design and management of the economic recovery of the war’s losers, Japan and Germany, would bring increased prosperity to these nations, too.² It was generally believed that only widespread prosperity could secure lasting peace. Moreover, the Marshall Plan would subsequently provide the model for development policies in the Third World, as the “unaligned nations” would shortly call themselves. Science and technology played a central role in these economic and political plans, as President Harry Truman emphasized in his 1949 inaugural address.

More than half the people of the world are living in conditions approaching misery. Their food is inadequate, they are victims of disease. Their economic life is primitive and stagnant. Their poverty is a handicap and a threat both to them and to more prosperous areas. For the first time in history humanity possesses the knowledge and the skill to relieve the suffering of these people. . . . I believe that we should make available to peace-loving peoples the benefits of our store of technical knowledge in order to help them realize their aspirations for a better life. . . . What we envisage is a program of development based on the concepts of democratic fair dealing. . . . Greater production is the key to prosperity and peace. And the key to greater production is a wider and more vigorous application of modern scientific and technical knowledge. (Truman 1949 [1964], in Escobar 1995)

The newly organizing development agencies in the United Nations and in many Western countries would transfer Western scientific rationality and technical expertise to the “underdeveloped” societies around the globe. In the language of the day, the “haves” would share their

achievements with the “have nots,” for the benefit of both. The development of export economies grounded in capitalist assumptions would permit these “handicapped” nations to earn income in global markets and supposedly to distribute prosperity throughout their societies and, especially, to their poorest citizens. In doing so, they would remove the economic reasons that the poor and disenfranchised might have to follow the meglomaniacal leadership of new dictators intent upon leading their armies down yet another warpath. The “transfer” of scientific rationality and technical expertise from the West to “the rest” was to create the prosperity that could secure world peace.

This economic support looked good to many of the intended recipients of these development plans. After all, enslavement, death, and further impoverishment had been the lot of losers in most earlier wars. Yet these new plans would not turn out as the West envisioned. Nor, it would be revealed, was everyone involved in designing them quite so idealistic about the mutual benefits that development could provide. Yet the Marshall Plan, the United Nations development projects for unaligned nations, and the apparent lack of retributive punishment dealt by the “winners” to the losers for the suffering their empire building had inflicted on so many people (except for penalties applied to a few of the highest leaders of Germany and Japan)³ did mark some kind of world-historic event. It certainly was initially appreciated, if with mixed feelings, by many everyday citizens in the defeated nations. In retrospect, less cheery assessments would be made (Escobar 1995; Sachs 1992).

“Urgent News: Science is Autonomous from Society” As indicated by Truman’s inaugural address, in this thinking there were clear signals that science and technology were going to be embedded in and permeated by specific economic and political interests.⁴ The Manhattan Project’s atomic bomb research program had occurred only thanks to a huge infusion of federal funds into the laboratories at Los Alamos. This was new. Earlier research in fields such as physics and engineering had been funded primarily by corporations such as General Electric, General Motors, Bell Labs, Westinghouse, and Sylvania. Indeed, it was the Manhattan Project that put US physics on the map of world-class science. Moreover, broad-scale federal funding of scientific research got underway after the war with the creation of the National Science Foundation. US taxpayers were going to fund a great deal of scientific and technical research. No wonder leaders of the scientific community began to insist that science was a “little democracy” requiring Congress to provide no oversight of the sort that voters expected it to give to any other

expenditure of public monies. As historian David Hollinger (1996) argues, the leaders of the scientific establishment were worried about Congress and curious publics wanting to participate in deciding which scientific projects should and which should not be funded with tax dollars. The “autonomy of science” arguments were propaganda to protect fledgling scientific institutions from the congressional and other political interference they expected. To be sure, research in the United States was more protected from electoral politics than were science projects in many other countries. But it was certainly not autonomous from federal or corporate interests and desires. Then, with the founding of the United Nations and national development agencies in the West, the development projects were to transfer such supposedly apolitical, value-neutral scientific rationality and technical expertise to Third World societies yearning for a better life.⁵

The emergence of the Cold War, and especially the launch of Sputnik by the Soviet Union, also stimulated additional increase in federal funding of scientific and technical research and education. However, the legendary free-floating curiosity of scientists was not what the government wanted to fund.

Whereas the mythologies of the “golden age” of Cold War science tell a story of abundant funds available to individual scientists who freely pursued exciting new knowledge wherever it might lead, the broader reality underlying this Elysium was that the Department of Defense created a huge, integrated knowledge production enterprise aimed at achieving a particular desired outcome—victory over the Soviet Union (Sarewitz 2011, 415).

After Sputnik, many federal agencies wanted to participate in strengthening US scientific capacities against what were perceived as the belligerent attitude and expansionist plans of the Soviet Union. Leading the way were the Department of Defense and the Department of Energy. The latter was the successor to the Manhattan Project.

In short, a variety of humanitarian, economic, security, and nationalist interests combined with intellectual motives and intentions and mixed in various proportions to create a rich brew of justification for massive new state and corporate funding of scientific and technical research in the decades immediately following World War II. The philosophy of science guiding these projects was formed through various negotiations between the contradictions and tensions in these sometimes collaborating and at other times competing projects.

This brief sketch of some of the major forces shaping philosophies of science in the middle of the last century enables us to begin appreciating the political and intellectual importance for scientists of public belief in the autonomy of science from society. Leaders of the scientific community needed to convince Congress and the public that science was not a tool of the intense social and political forces swirling around it. It did not need congressional oversight of the immense public funds it was now beginning to receive for projects clearly intended to serve economic, political, and often military purposes as well as humanitarian ones. So its philosophy of science claimed that its ability to secure autonomy and value-freedom, and thereby to discover nature's true order, was historically unique. This was the exceptionalist stance: no other science had ever existed or could exist that was better able to develop the resources to represent nature's order as it actually existed, and to intervene in it effectively. All other knowledge systems—past, present, and future—were already and would inevitably be full of the kinds of cultural biases that, it was assumed, so clearly deteriorated the reliability of any critics of science's agendas as well as of traditional thought in other cultures and in the West's earlier history. And this exceptionalism legitimated a triumphalist stance. The history of science consisted only of a long series of heroic achievements.

Yet even in those optimistic, heady days, a few critics were already asking how a supposedly value-free science could have in fact created and developed the atomic bombs dropped on millions of Japanese civilians. Moreover, didn't modern Western science also have some degree of responsibility for the effective gas chambers, efficiently running trains, and talented munitions industries through which the holocaust was enacted? After all, the European and US physicists themselves had debated the ethics of working on the atomic bomb. Was the value-free autonomy-of-science stance taken by leaders of the scientific community simply an attempt to distract attention from the actual workings of modern Western science and technology institutions, and to encourage the scientists, Congress, and the public to be as ignorant as possible about such workings? Was it a major attempt to promote anti-intellectualism?

Scientists, the leaders of scientific institutions, and philosophers had an answer to such criticisms. These admittedly hideous phenomena were the result of bad politics alone. The science used in the projects was itself pure, basic research that could be used for good or for ill. Unfortunately, these projects were indeed examples of how bad men had applied scientific knowledge for bad purposes—or of how ordinary men had simply “followed orders” in producing the “banality of evil,” in Hannah

Arendt's phrase. Or at least they were examples of how otherwise good men had applied pure knowledge for questionable ends. The results of this very same pure scientific research also could be used for good purposes, scientists and their supporters argued. They initiated various programs to develop "atoms for peace." Nor was corporate science to be left behind in this optimistic era of expansion of Western scientific rationality and technical expertise. Corporations developing weapons for use by the US military in Vietnam, such as the napalm sprayed from planes that scalded civilian men, women, and children, also promised "better things for better living" through chemistry. And hugely profitable agricultural corporations promoted a "green revolution" in which their patented seeds, expensive fertilizers, and toxic pesticides supposedly would eliminate hunger (Sachs 1992). Intentionally or not, the philosophers were complicitous in creating an exceptionalist philosophy that positioned Western science as uniquely capable of advancing human progress. They also contributed to a triumphalist belief in the legitimacy of accumulating all the perceived benefits of research for pure science and its philosophy while distributing the costs to institutions and individuals defined as being outside of the actual conduct of research. What was to count as science was to be restricted to what happened in laboratories.

Thus an exceptionalist and triumphalist philosophy of science was propagated precisely at the moment when research in the United States and Europe was becoming more deeply directed by nationalist, military, and corporate economic and political values and interests. The logical empiricist philosophy of science helpfully aligned itself with economic and political projects of its era. This is the philosophy of science that we all learned in the 1960s and '70s. It still is found compelling by most scientists and educated citizens of the West today, as well as by people around the globe. Yet it was grounded in political and intellectual contradictions and tensions at its very birth. Faith in its standards for objectivity was crucial to its continuing to receive taxpayer dollars without excessive congressional or public oversight. But was this faith justified in fact . . . or even in principle?

These issues are pursued in the next chapter. And we return in chapter 5 to explore another contradiction in this historical moment that has surfaced to create puzzlement in today's philosophy of science debates. How value-free was the philosophy of science of the Vienna Circle, in which the original founders of today's philosophy of science were located? What did it mean by the desired "unity of science" that so animated subsequent logical empiricist philosophical work? But let us turn

now to a later important era for today's philosophy of science, and one that remains inadequately understood: the 1970s.

Development Fails; Anti-Authoritarian Social Movements Emerge; Globalization Has Consequences for Scientific Research

By about 1970, three apparently independent phenomena occurred that are relevant to the narrative here.

Development Fails The first phenomenon was that development policies for the Third World were recognized to have failed in important respects (Escobar 1995; Sachs 1992). The gap between the rich and the poor had not diminished in the first two decades of development policies and practices; instead it seemed to be ever-widening. Moreover, the “underdeveloped” countries were unable to repay their development loans. Northern banks, through the World Bank, forced them to institute “structural adjustment policies.” The debtor countries were ordered to cut their recently acquired health, education, and other social service programs so that all funds could be channeled only to creating export economies. As we will see in chapter 3, this was a double whammy for women. They had been most of the providers of such services, and they were fired. They lost income they badly needed to support themselves and their families. Perhaps a majority of them were heads of households. Lack of paid employment left them available to provide the same needed services for which they had been paid, but which they now delivered for free just to their own families while having to figure out how to keep themselves and their dependents from starving (Harcourt 1994; Kuiper and Barker 2006; Visvanathan 2011).

The failure of development policies to raise living conditions sustainably for everyone would not have come as a surprise to the designers of such policies. Here is a United Nations statement from just two years after President Truman's speech:

There is a sense in which rapid economic progress is impossible without painful adjustments. Ancient philosophies have to be scrapped; old social institutions have to disintegrate; bonds of caste, creed and race have to burst; and large numbers of persons who cannot keep up with progress have to have their expectations of a comfortable life frustrated. Very few communities are willing to pay the full price of economic progress (United

Nations, Department of Social and Economic Affairs 1951, quoted by Escobar 1995, 4).

Should development be regarded as having brought progress when the gap between the rich and the poor had vastly increased during the development era? The whole point of development policies was supposedly to provide the kind of broad-scale prosperity that could make war and uprisings against privileged groups a less attractive option among the disenfranchised.

Important for our narrative here is this question: Did the failure of development policies have implications for what had been envisioned as the “motors” of development? Was there something wrong with assuming that general social progress would result when scientific rationality and technical expertise, as these had been understood in the West, had been transferred from industrialized to nonindustrialized nations?

Anti-Authoritarian Social Movements Emerge By 1970 a number of anti-authoritarian social movements had appeared in the United States and Europe. Criticisms of First World scientific and technology research were produced in most of these movements. The civil rights movement in the United States drew many thousands of African Americans, other marginalized peoples of color, and whites to demand from the federal government an end to discrimination on the basis of race—discrimination that had been and would continue to be supported by scientific research on racial differences, and that would be used by government agencies, schools, corporations, and local communities and their businesses. Widespread protests against the US war in Vietnam and against US militarism more generally contained critical challenges to the centrality of scientific and technological research that was flourishing on funding from federal military projects. Philosopher Noam Chomsky famously pointed out how the behaviorist psychology that was attracting such favorable attention at the time, even among philosophers (e.g., Quine 1960), was used to justify hideous military policies in Vietnam. An early stimulant of environmental movements was Rachel Carson’s *Silent Spring* (1962). Carson blamed agribusiness and its use of pesticides for widespread ecological damage.

By 1970 the women’s movement was beginning to gather strength with lawsuits against workplace discrimination, attempts to add an Equal Rights Amendment to the US Constitution, “take back the night” marches demanding an end to violence against women, efforts to bring equity to college funding of sports programs, demands for better access

to birth control and abortion, increased attention to women's health issues, and the introduction of the first women's studies courses on college campuses. Prevailing male supremacist thought assumed that women's lives should be controlled by men. The ecofeminist movement and feminist environmentalism, the latter more focused on social structural issues, linked issues about men's domination of women to the Western tendency to assume that human control of natural forces was necessary for humans to flourish (Griffin 1978; Braidotti 1994; Seager 1993). These movements also mounted critiques of sexist and androcentric tendencies in the mainstream environmental movements.

Meanwhile, the Danish economist Ester Boserup (1970) published her widely influential study *Women's Role in Economic Development*, thereby initiating analyses from the standpoint of women's lives of the successes and failures of development policies and practices around the globe. Had women been left out of development? Feminist and postcolonial critics asked a different question: Was the appropriation of peasants' and women's labor and land rights by corporations the source of much of the increase in capitalism's profits? With more land and more labor, corporations had more capital. Was a new era of "primitive capital accumulation" expanding the labor and natural resources available for corporate profiteering at the expense of the welfare of the globe's most vulnerable groups (cf. Mies 1986; Visvanathan 2011; chapter 3 below)? Feminist challenges to development policies and practices drew on the new criticisms of gender assumptions. These were rapidly emerging from coalitions between women's political activism and the work of feminists within each social science.

Feminist epistemology and philosophy of science raised issues alongside and within the emerging criticisms of the sexism and androcentrism in the natural and social sciences. These issues quickly became influential in research disciplines *outside* philosophy, for they provided compelling arguments on behalf of the legitimacy and value of the new women's studies research in such disciplines (Richardson 2010). They also contributed to the anti-authoritarian changes already underway in academia more generally, thanks to the social movements of the 1960s. Concepts such as standpoint methodology, strong objectivity, scholarly practices of "disappearing" women, and situated knowledge became everyday terms among researchers and their students (Code 1991; Haraway 1991; Harding 1986; Harding and Hintikka 1983; Longino 1990).⁶

Additional anti-authoritarian social movements also appeared during this era, such as the lesbian, gay, and queer movement and the disability movement, to mention just two such movements which posed

natural and social science issues. It was the intersection of these anti-authoritarian social movements with some distinctive features of globalization that has deepened the effects of both on natural and social science research.

Globalization's Effects on Scientific Research Globalization is the third of the significant social transformations that occurred around 1970. It is more accurately described as capitalist economic restructuring on a global scale. The emergence of the internet and cell phones has enabled increases in the geographical scale and local intensity of new forms of capitalist expansion. The new electronic media, combined with the increased poverty of those who were already the poorest of the poor around the globe (thanks to early development policies, as noted above), enabled capitalism to intensify older markets inexpensively and to enter new ones. Such processes also escalated cultural, familial, and other kinds of social restructuring. Much has been written about globalization. Here, let us focus on its effects on the institutional structures of scientific research.

Globalization both opens and closes opportunities for progressive research in universities, as sociologist David Hess (2007) points out. It has brought new kinds of scrutiny upon university research. "From above," says Hess, the state and corporations have demanded more control of research processes and their outcomes. At the same time, the state has decreased funding to higher education, while corporations have increased their funding. Such patterns can be seen, for example, in pharmaceutical, electronic, and genetics research. The government constantly requires increased enrollments without providing financial support to universities, or directly to students, for the additional services this requires. Moreover, university work life increasingly is administered through standards and processes developed for the business world. Faculty are required to provide greater bureaucratic accountability for how they spend their time and for their teaching and publication productivity. (Would that Wall Street were subjected to equivalent government and public scrutiny and control!) Conservative media appeals to "egalitarian" public anti-intellectualism further deteriorate the ability of universities to manage their own projects. And all of this pressure occurs in the context of repeated assessments that higher education in the United States is the most influential and successful of all of the country's global exports.

These mostly dark sides of globalization for university research are relatively well known and will not be pursued further here. Of greater

interest for this project is the perhaps surprising argument by Hess that within globalization processes have emerged four kinds of institutional changes “from below” that can provide resources for attempts to relink science to democratic goals. He refers to these changes as forms of “epistemic modernization” in which the agendas, concepts, and methods of science are being inspected and transformed in ways that create “new forms of epistemic primitive accumulation.”

Epistemic modernization refers to the process by which the agendas, concepts, and methods of scientific research are opened up to the scrutiny, influence, and participation of users, patients, NGOs, social movements, ethnic minority groups, women, and other social groups that represent perspectives on knowledge that may be different from those of economic and political elites and of mainstream scientists. In a sense, the change represents a return, but under very different historical circumstances, to the conditions of early modern science. In the history of early modern science, an epistemic primitive accumulation occurred when Western explorers and scientists traveled the world and brought home the diverse local knowledges of plants, animals, landscapes, languages, medicines, and social institutions” (2011, 420).

Hess here refers to the way in which the sixteenth- and seventeenth-century European “voyages of discovery,” followed by the colonialism and imperialism of the seventeenth and eighteenth centuries, incorporated into European scientific and technical research information, methods, and materials developed in non-European societies.⁷ Hess draws here on the Marxian notion of primitive capital accumulation through which communally shared peasant labor and lands in Europe were appropriated by members of the emerging capitalist class and their private industries to enable the production of profit for factory and farm owners. The owners could reap profits by selling the fruits of the former peasants’ land and of the workers’ labor for much more than they paid for the labor of workers and for raw materials.⁸ But it was not just labor and land rights that this early capitalist class gathered into its production processes, Hess is arguing. Even earlier, the European expansion that began in the 1500s and continued through the Industrial Revolution created *epistemic* primitive accumulation. Indigenous astronomy, mapping, agriculture, botany, and many other kinds of knowledge were appropriated directly into modern Western sciences during those periods.

Little of this appropriation is acknowledged even today, outside of recent scholarly work (Harris 1998; Schiebinger 2004; chapter 4 below). Today, Hess proposes, globalization has enabled a second form of epistemic primitive accumulation by scientific and technical research. It, too, immiserates the producers of indigenous knowledge. But this epistemic primitive accumulation can give hope to struggles for social justice. It is worth taking a brief look at the four kinds of “epistemic modernization” that, Hess proposes, are enabled through globalization tendencies.⁹

The social composition of the scientific workforce has become increasingly diverse. A walk around your local university campus will reveal a diversification of the workforce that was not visible a few decades ago. Now women, racial and ethnic minorities, and workers of international origin are integrated into laboratory work and fieldwork, as well as into classrooms, on both sides of the lecture podium, and tenure committees. Moreover, these groups are attaining at least some of the highest research and policy positions as directors of laboratories, heads of natural and social scientific organizations, editors of scientific journals, and members of federal science and technology councils. Additionally, it is not just inside each country that the workforce has become diversified. International research is conducted by global networks of laboratories, universities, research stations, journals, publishers, and more. No longer is modern Western science done solely by Western elites.¹⁰ This is a way of thinking about “big science” that goes beyond the long lists of coauthors that sometimes appear on articles in scientific journals. The researchers in lab coats are not the only ones who produce scientific knowledge; they constitute only a small proportion of the workforce necessary to produce each fact.¹¹

Can this changed demography of the scientific workforce produce new agendas and new methods for scientific research that respond to the interests of the newcomers? Certainly this does not automatically happen. But sometimes it occurs. Philosopher Alison Wylie (2004) has documented this phenomenon among women archeologists. Donna Haraway (1989) and Sharon Traweek (1988) have done the same with respect to primatology and high-energy physics respectively.

Another change is that community-oriented research has appeared in many places. In Europe it first appeared in the form of “science shops,” in which teams of faculty and graduate students offered their services free of charge to solve scientific and technical problems that beset their surrounding communities. Participatory action research, widely familiar in the social sciences, has been taken up also, especially with respect to health and environmental issues.

A third kind of epistemic modernization occurs as publics demand a change in communication style between scientists and citizens. The old style assumed a one-way “transmission” model in which experts explained difficult scientific issues to a presumed ignorant and passive public. In the new interactive models, “civic science” and “citizen science” recruit scientists to their concerns in a variety of ways. There is “citizen advocacy,” in which citizens raise new questions to the sciences based on their own experiences of environmental, health, or other problems. They, with the newly recruited scientists, then try to turn the questions into researchable ones. Another form of interactive research involves cases in which the actual research on health or environmental research, for example, is initiated by citizens. A well documented example is provided in Steve Epstein’s (1996) account of how gays and their families and friends got the resistant federal government to fund HIV/AIDS research. Other examples include breast cancer survivors’ chemotherapy concerns (Abel and Subramaniam 2008) and citizen complaints about toxins downstream from polluting industries (Steingraber 1997). Social movements themselves sometimes advocate and generate new research agendas within their own relevant research fields. The women’s health movement, the Black health movement, disability movements, and gay and lesbian movements provide examples of such work.¹² In these cases both indirect and direct agendas are adopted. The indirect processes focus on formulating new research agendas, on regulation, and on producing new kinds of expertise. The direct processes involve recruitment and conversion of scientists to social movement projects, to biographical transformations as citizens retrain themselves to become HIV/AIDS or breast cancer researchers, and to the assembly of networks of research, funding, and influence to advance the desired scientific agendas at more powerful governmental or other institutional levels.

Yet one more change that Hess identifies is the development of what he calls alternative pathways. Here, scientists reform their professions from inside. Hess points to two examples. One is the establishment of moratoriums—for example, on weapons research or on recombinant DNA. In effect, the researchers go “on strike,” refusing to conduct these kinds of research and often stigmatizing their colleagues who continue to do it. Another example can be found in “people’s science.” During the Sixties and Seventies, scientists formed coalitions to conduct research that could benefit the Vietnamese peasants whose lives and environments were being destroyed by US militarism, and Nicaraguan peasants whose lives were being destroyed by government forces in their country that were supported by the CIA. More recently, Hess points out that we

can see such research agenda setting in support of renewable energy, sustainable agriculture, and green chemistry. Of course these kinds of research receive much lower funding than the research in service to nationalist or corporate interests. Yet it does get funded. Moreover, one never knows when the funding will suddenly increase dramatically in response to new governmental and or public perceptions, as is happening now with the development of renewable energy.

So while globalization clearly has greatly increased social inequality in many respects, it has also made it possible to open up the agendas, concepts and methods of scientific and technical research to priorities and resources “from below.” Skepticism about the often overvalued benefits of globalization is certainly warranted. But it is equally important to focus on the avenues to progressive social change in scientific and technical work that have been opened through globalization processes.

Science Studies Movements

Preceding sections of this chapter have drawn attention to ways in which scientific research and its philosophy were shaped by several powerful forces in the aftermath of World War II, and ways in which critical scrutiny of scientific institutions, their practices, and their philosophies have developed both “from above” and “from below” since about 1970. I have focused especially on the transformations “from below,” as Hess outlined them, because they are the tendencies concerned with relinking scientific research to democratic political agendas.

Here I turn to the field of science studies.¹³ Two related fields or subfields are postcolonial and feminist science and technology studies. All three of these research fields treat science as a social institution with features much like those of any other institution. They treat its products—such as scientific knowledge—as being in significant respects no less marked by the economic, political, social and cultural processes that produced them than are the products of legal, educational, or economic institutions. That is, they study science *scientifically*. Scientists themselves often have difficulty understanding how they, their institutions, practices and cultures, and especially their knowledge claims, could reasonably also be the objects of someone else’s critical scrutiny. Certainly scientific errors and frauds deserve such investigation, but not good research, they say.

One of the most fruitful insights of these science studies is that sciences and their societies co-produce and co-constitute each other. Societies that are located in different parts of nature’s order and are organized

in different ways need specific kinds of knowledge that are relevant to the ability to survive and flourish in their particular natural and social circumstances. They tend to produce such knowledge in the ways that they produce everything else. In turn, sciences share their societies' fundamental assumptions about what is interesting and important to know. Thus racist, sexist, and imperial societies will tend to sponsor sciences that, in turn, provide resources for racist, sexist, and imperial societies. Here this insight will be used to frame understandings of how societies and their philosophies of science have transformed each other in particular historical eras since World War II. Moreover, this notion of coproduction can also be appropriated from its descriptive use in science studies to be used for projects that are intended to transform both sciences and their societies in ways that better link them to pro-democratic tendencies. That is, coproduction can be an advocate's and activist's category as well as one used purely descriptively by a social scientist.¹⁴ Yet in the mainstream studies, explicit advocacy and activism on behalf of changing societies and their sciences are usually suppressed themes, at best. The mainstream studies tend to approach science and society relations only retrospectively; they only rarely address how to relink sciences and their philosophies more strongly to pro-democratic social tendencies, whether locally or globally.¹⁵

All three of these science studies fields influence the project of this book. Indeed, my argument is that each field needs the other two to succeed in order for each to achieve its own announced objectives. All three share some affinities. However, while the particular historical contexts in which each was created have produced powerful analyses, a preoccupation with only such contexts has left gaps for each in its understanding of the other projects. Sciences and their societies would benefit if these science studies fields became more selfconsciously integrated with each other without giving up their distinctive strengths.¹⁶

Feminist science studies began at roughly the same moment as the mainstream science studies field discussed above. Historians, sociologists, and ethnographers of science brought a "gender lens" to their examinations of the histories and present practices of the sciences. That is, in this work gender is treated not only as a property of persons "out there" in social relations, but also as a property of symbolic and structural relations. Gender is also an analytic tool, just as are race and class, for example. These studies have ranged from histories of women in the sciences and discriminatory practices securing their exclusion, to case studies of gender biases in the choices of research topics, the favored concepts and hypotheses, the design of research, the choices made about

what does and does not count as evidence, the interpretations of data, the conclusions drawn, and the uses and applications made of such research. Moreover, gender is not just another word for “women,” as attempts to “mainstream gender” in international agencies often assume. Gender is a social relation between men and women, between their stereotypical characteristics, and between their assigned structural positions in gender, race, class, and other relevant social hierarchies. Thus it is important also to examine the masculinity of scientific discourses—for example, in their typical appeals to the heroic and self-sacrificing discoveries of explorers or of Christian aristocrats (see, for example Terrall 1998; Harrison 2005). This is not the place to provide a literature review of this field.¹⁷

Of course there are already voluminous literatures on gender issues in every social science. Is this work relevant to the social studies of science and technology? Absolutely. The critical foci of feminist work on prevailing histories, sociologies, ethnographies, political sciences, and economics analyses have implications also for the histories, sociologies, ethnographies, political sciences, and economics of those social institutions we refer to as science and technology. Thus, the three fields of science studies (including feminist ones) are themselves also appropriate objects of feminist social studies.

Moreover, feminist epistemological and philosophy of science projects have had powerful effects on feminist work in other research disciplines, as mentioned earlier, including social studies of science. Already by the mid-Seventies these studies were being cited in support of the importance of feminist research in other disciplines, in support of the establishment of women’s studies programs as necessary sites for new kinds of valuable intellectual innovations, and as raising important challenges to how research institutions such as universities understood their missions. The philosopher Sarah S. Richardson (2010) provides a valuable analysis of feminist philosophy of science in a study of how its issues were institutionalized through special issues of journals and anthologies aimed at both classrooms and scholarly work. She identifies significant contributions it continues to make to mainstream philosophies of science through its case studies of sexist bias, its reexamination of conventional questions and raising of new ones, and its modeling of how to do interdisciplinary research in the field of philosophy. Richardson points out that unfortunately this kind of study mostly remains highly marginalized in mainstream philosophy of science. There are several reasons for this. One is that women are highly marginalized in the field. Another is that mainstream philosophers tend to oversimplify, distort, and

truncate the feminist arguments that they encounter. And a third is that the field seems unable to understand that there could be any relevant issues beyond biases against women in the sciences. This last problem leaves firmly in place the model of value-free science, which has been a major target of criticism in feminist work. Richardson counters that in fact, feminist philosophy of science understands sciences and their philosophies as “value-rich,” and that its great strength is in developing robust and dynamic philosophical frameworks for modeling social values in scientific research. Arguably even worse than mainstream philosophy of science in terms of marginalizing feminist work is mainstream epistemology, as philosopher Phyllis Rooney argues (2007; 2012). Rooney provides a thorough account of a broad variety of feminist epistemological work over the last three decades, and shows just what is wrong with the criticisms and dismissals it has received in the field.¹⁸

The third science studies field that informs this project is postcolonial work, which began to emerge in the writings of Franz Fanon (1959), Phillip Curtin (1961) Daniel R. Headrick (1981) and Michael Adas (1989). The last two decades have produced a substantial body of such work. (Seth 2009b). By now this field is beginning to flourish, with the recent appearance of three special-issue journals on the general topic (Macleod 2000; Anderson 2002; McNeil 2005), an official entry by Warwick Anderson and Vinceanne Adams in the prestigious *Handbook of Science and Technology Studies* (Hackett et al. 2007), and a reader (Harding 2011a). Additionally, an increasing supply of monographs and edited collections on special research areas (botany, geography, medicine, indigenous knowledge) has been emerging.

Because mainstream postcolonial studies became institutionalized in US universities primarily in literary and cultural studies departments, a few mainstream science studies scholars have tried to use that framework to think about the histories of sciences’ interactions with colonialisms and, now, postcolonialisms. However, I have argued that a somewhat different and powerful postcolonial turn to science and technology studies arrives from the concerns of mostly Third World scholars in the context of practical and policy issues concerning how to focus national science and technology work in the newly decolonized states of the Global South, and what the relation of such projects should be to those of the Global North (Harding 2011a, b). Research to resource Northern militaries and to expand Northern-controlled market projects tend not to be priorities in these decolonizing countries!

The postcolonial research projects have included developing counterhistories to the exceptionalist and triumphalist ones that have

characterized the history of science in the Global North, reevaluating the strengths and limitations of indigenous knowledge systems, and intervening in the North's so-called development projects for the Global South.¹⁹ Again, this is not the place to provide a literature review of this field. Yet Suman Seth's (2009a) fascinating introduction to a special issue he edited entitled "Science, Colonialism, Postcolonialism" is a good place to start, since he identifies central themes in this work that deeply challenge the standard Eurocentric accounts of the history of modern Western sciences and their encounters with other cultures' knowledge systems. Seth emphasizes that modern Western sciences have from their origins been constituted in colonial contexts which leave their systematic marks on the sciences we have today. Yet the violence of colonialism in "the childhood of science" is now hidden from view through the presentation of a thoroughly depoliticized history of modern Western sciences. Indeed, I have argued that though globalization and transnationalism are certainly legitimate and illuminating topics in their own right, a preoccupation with them tends to make the colonial past and neocolonial present of the sciences fade into a now "uncool" moment of the 1970s and 1980s which we are now supposedly entitled to move past.²⁰ Fortunately, important tendencies in postcolonial science studies have refused to let these powerful histories and current politics slip out of view.

Though many researchers of Northern descent have made significant contributions to this work, this field nevertheless has not been well represented in science studies contexts in the North. Yet it now is rapidly entering into a variety of international debates about how to relink scientific research to democratic social goals. (Harding 1998; 2008; 2011) Regional divisions of the formerly exclusively Northern-focused Society for the Social Studies of Science (4S) have started up in East Asia and, most recently, Africa.²¹ Ongoing collaborations between these three divisions of 4S are now interacting also with the two-decade-old similar Latin American organization Sociedad Latinoamericana de Estudios Sociales de la Ciencia y la Tecnológica (ESOCITE).²²

These three social movements which are focused on sciences and their philosophies, as I am referring to them, are central to our project here because their diverse and sometimes conflicting assumptions help to frame new questions about the objectivity of research. That is, my analyses are anchored in their work in order to evaluate critically which philosophies of science can meet the challenges to the dominant logical empiricist philosophy that these research fields have raised. I am not interested in demonizing philosophy and romanticizing various science studies—that is, in reversing the typical logical empiricist stances toward

these disciplines. Rather, this study seeks to understand better how philosophies of science that provide resources for democratic social relations can flourish in the new social, political, and economic worlds in which we find ourselves these days.

The Mutual Support Claim: Six Arguments

With that goal in mind, this study provides six arguments in support of the claim that the social norm of diversity and the epistemic norm of objectivity can provide mutual support for each other. First, the account of the “strong objectivity” standard (chapter 2) identifies the logic of the mutual support claim: in at least some cases scientific and philosophic research can be directed by recognizably political, social, and cultural values and interests and yet still be fair to the evidence and fair to its severest critics. These fairness requirements have been fundamental goals of any standard for maximizing objectivity. The need for strong objectivity arises when existing research communities are too homogenous and too isolated from pro-democratic social tendencies. Such research that starts from outside such homogenous communities can be directed by progressive social and political commitments and, because of the limitations of the existing scientific communities, can maximize objectivity more effectively than the existing, supposedly value-free communities.

Second, the mutual support claim has global implications (chapter 3). Starting research about Third World development policy by examining the daily lives of the poorest women in the Global South reveals many empirical errors and distortions in the development assumptions that, for example, shape World Bank policy. It shows that development policies that fail to take into account the everyday needs of the poor actually immiserate them even further. So social and natural science facts provide evidence for the mutual support claim.

A third argument makes a case for the reliability of many assumptions and practices in indigenous knowledge systems. These systems are unjustifiably discounted by Northern scientists precisely because they are embedded in and permeated by local cultural assumptions. Yet in chapter 4 we can see that not only are these indigenous systems largely empirically reliable for interactions with the natural and social environments for which they were designed, but also that their sustainability makes important contributions to the preservation of global biodiversity. We live in a valuable world of multiple sciences.

Fourth, it is not just other cultures’ sciences that are culturally embedded. Chapter 5 identifies how recent histories of the Vienna Circle,

and the journey of its philosophy of science from fascist Europe to the United States in the era of McCarthyism and the Cold War, reveal that the value-free commitments of logical empiricist (logical positivist) philosophy became so compelling because they provided badly needed political protection for scientists and philosophers. They did not gain such widespread acceptance purely because they were epistemologically compelling. The commitment of logical empiricism to the value-freedom of scientific research and its philosophy has not itself been value-free!

A fifth argument pursues an observation made earlier by at least a few historians of science: Christian values and interests had positive effects on the advance of modern Western sciences (chapter 6). So too, it turns out, have the explicitly secularist assumptions of the dominant forms of secularism in the West. This is because this secularism is in fact still Christian and even Protestant. Secularisms are always constituted *within* the particular religious traditions to which they adopt a non-observant stance. Thus, modern Western sciences and their philosophies have a “Protestant unconscious,” to borrow a phrase from social theorist Fredric Jameson (1981). This is so in spite of the fact that these assumptions are virtually never entertained in the thought of scientists and philosophers as explicitly religious ones. Thus even religious or spiritual experiences, beliefs, and interests need not be regarded as damaging the reliability of the results of scientific research. Moreover, this insight reveals that a distinctive form of secularism (Christian, Protestant) has been a cultural force in the history of modern Western sciences—not the absence of such a force, as has been assumed since the Enlightenment.

Finally, these mutual support arguments align with increasingly accepted insights of the field of science studies, such as the idea that sciences and their societies co-produce and co-constitute each other. This insight frames discussions in all of the following chapters. Another such aligned insight is that the notion of scientific and technical expertise should be expanded to include individuals and the societies that have experiential knowledge of natural facts and processes—as, for example, do the Pacific island navigators and Cree goose hunters discussed in chapter 4. Other such alignments will be pointed out in context. The point here is that the arguments in the social justice movements for regarding the social norm of diversity and the epistemic norm of objectivity as advancing each others’ projects can draw strength from much work done in the field of science studies that does not overtly advocate the social justice projects.

To respond to the questions raised earlier, the argument here is that philosophies of science should indeed reflect on how their priorities,

ideals, and practices align with particular kinds of global, historical tendencies. Cold War residues in these philosophies deny them resources that could enable them to produce analyses more relevant to how science functions in today's world, and to relink scientific research to the projects of democratic social movements around the globe. To fail to take up such opportunities is to leave sciences and their philosophies beholden primarily to the concerns of antidemocratic social forces, especially militarism, corporate greed, and antidemocratic nationalist tendencies in states. Fortunately, there are valuable new directions visible in the three fields of science studies that enable the reclamation of sciences' democratic legacy. They draw attention to the need to reposition research in new kinds of pro-democratic environments, from the global feminist and postcolonial science and technology projects to the many local "citizen science" initiatives, and to the increasing desires of pro-democratic uprisings here, in the North, and around the globe. These repositionings can legitimately claim to have reshaped what counts as objective research in ways that—ironically—echo still valuable tendencies in both the Enlightenment impulse and in the mid-twentieth-century modernization projects.

To begin, what is "strong objectivity" and what can it do?

2

Stronger Objectivity for Sciences from Below

Problems with “Good Research”

A distinctive standard for maximizing objectivity in research emerged from feminist discussions of the 1970s and '80s.¹ This standard had to be stronger than the prevailing ones since the latter had permitted sexist and androcentric assumptions and practices to shape some of the very best research in biology and the social sciences. Of course one could expect social values and interests to influence the results of research projects that failed to insist on the most rigorous methods. But “bad science” was not the main target of criticism here. The offending projects did already meet the prevailing research standards in their disciplines, whether quantitative or qualitative. The problem was that “good science” lacked the methodological resources to detect widely held sexist and androcentric assumptions and practices that had shaped these results of research.²

Was the value-free standard for objective research the only reasonable one? Most people thought so. In spite of earlier intimations of deep problems with the prevailing standard, at least for the social sciences (e.g., Bernstein 1982), no viable alternatives had been proposed. In the context of the women's movements of the 1970s, a few voices were heard calling for the abandonment of the

ideal of objectivity. But these calls came primarily from a few qualitative social scientists—ethnographers especially—where struggles to justify the value of qualitative research had to contend with critics among their colleagues who thought that only quantitative research, presumed to be value-free, could be informative in a way that advanced the reliability, the predictive power, of social research.³ In contrast, feminist researchers in the natural sciences and most who worked in the social sciences wanted stronger, more competent standards for objectivity, whether quantitative or qualitative research was at issue. They wanted clarity about the nature of women's reproductive systems and of women's reasoning powers, about the causes of women's impoverishment and exclusion from economic and political decision-making, and about the illegitimacy of sexual assaults and domestic battery. Cultural relativist arguments, frequently used in anthropology, for example, were not acceptable in these contexts, they insisted.

Yet they had to figure out how to deal with the commonly perceived tension between the reliability of the results of research and the direction of research by political, social, and/or economic motives and interests, whether of scientists, sponsoring institutions, or the funders of research. Most natural scientists, quantitative social scientists, and philosophers of science found no reason to doubt that social and political values and interests could only damage the reliability of the results of research. The advance of "pure science" and "basic research" were considered the most important goals of good science.

What were these sexist and androcentric assumptions identified by feminist critics that had shaped what was regarded as the very best research? The literature here is immense, so just a few examples will have to suffice for now.⁴ In biology, medical, and health research, women's bodies tended to be conceptualized as being no different from men's except for their hormonal and reproductive systems, their smaller physical size, and the supposed limitations of their brains. Yet women suffered unnecessary sports injuries until coaches learned to recognize the distinctive anatomical differences that affected their performances. An influential metastudy of sex-difference studies found only six significant differences in boys' and girls', men's and women's innate skills and capacities (Maccoby and Jacklin 1974). Women's normal bodily processes, such as menstruation, pregnancy, childbirth, and menopause, were consistently treated as problems that needed management by the medical and pharmaceutical industries. The relief of depression in women was to be treated with drugs such as Valium rather than by addressing the causes of their depression, which were mostly to be found in oppressive

social relations. Women's beliefs and behaviors revealed them to be either immature forms of men or inferior forms of human, according to the dominant assumptions. Biologists and philosophers of science challenged virtually every form of biological inferiority attributed to women in a rich series of studies beginning in the early 1970s.

In the social sciences, the gender-stereotyped lenses of the disciplines led to women's natures and activities being either ignored as natural, or misdescribed. To start, it was gender relations, not sex differences, that were primarily responsible for women's conditions, feminists argued. Presumed sex differences were reexamined through empirical studies that identified the normative social relations that created women's supposedly "natural" daily lives. For example, the everyday activities of "woman the gatherer" turned out to be the main source of economic resources for everyone. The daily fare of hunter-gatherer societies consisted primarily of seeds, berries, greens, roots, and the small mammals and birds caught by women. The economic contributions of "man the hunter" were relatively infrequent treats, it turned out; not the day-in, day-out source of sustenance anthropologists had claimed. Women, not men, were the main "breadwinners." Economists went on to challenge the way "work" was conceptualized, such that women's part-time, temporary, and seasonal work; their manufacturing and service work done in the household; their housework; their "caring labor" for children, kin, and other dependents; their sex work; and their work for volunteer organizations didn't count as work. (We return to this issue in chapter 3.) Moreover, most anthropological accounts were based on interviews and observations only by male anthropologists only of men in non-Western societies. Often, women in these societies were not permitted to speak to men outside their own families. Yet those male informants, like their Western counterparts, often knew little about women's activities and social relations. The Western interviewers and observers tended to project Western gender stereotypes onto other cultures' social relations.

Political theory assumed that "the political" was only what men engaged with in statehouses, courthouses, and diplomatic circles. Yet gender relations in households and workplaces were also fully structured by relations of power and authority, the critics pointed out. Moreover, women's voting patterns did not necessarily simply follow those of their husbands or fathers, as had been assumed. Women and men had different interests in households. Benefits to households or to "heads of households" were not distributed equitably within those households. Thus, women and men had different interests in various public policy issues.

The “women’s vote” turned out to be an important determinant of electoral politics. Sociologists assumed that the relevant social relations on which to focus were only the public and dramatic ones in which men engaged, ignoring most of women’s social relations.

Linguists charted the different speech patterns of women and men and the power relations each articulated and enforced. Psychologists critically examined the ethics of rights that has grounded liberal democracies. This ethics centers conflicts between autonomous adults who are capable of articulating their needs and desires. Feminists insisted on a complementary ethics of care and responsibility, originating in the challenges women faced in making moral choices between the needs of, for example, the small children and the elderly and sick who were in their care, none of whom were autonomous or fully articulate adults. In every disciplinary organization, women’s caucuses and feminist research collectives formed to challenge dominant disciplinary assumptions and to pursue neglected questions to which women wanted answers. So-called women’s issues could not simply be added to disciplinary knowledge. The pursuit of such issues often challenged basic assumptions of the disciplines. Thus, recognizing and valuing this kind of diversity in social values and interests would increase the reliability of the results of research, feminists argued. And by using a methodology that answered questions that women wanted answered, women gained resources to advance their interests and desires. What was this methodology?

In epistemology, philosophy of science, sociology of knowledge, and political theory, “standpoint theories” began to emerge from this new women’s movement research.⁵ Taking inspiration from the Marxian “standpoint of the proletariat,” these theorists argued that in societies structured by inequality, the prevailing knowledge and belief tended primarily to represent the interests of the dominant groups. Yet these groups were made up almost entirely of men. Women had been excluded from full participation—or even any participation—in such groups. Thus the dominant conceptual frameworks of the disciplines were by no means value-free. They were instead frameworks that responded to the interests of dominant group men. The research results produced within such frameworks were then used to design social policy that “made real”—that installed in social life—only those men’s points of view. Catherine MacKinnon (1983) famously argued that “the state is male” to the extent that it understands rape only from the perspective of the men perpetrators. The more “objective” a claim appeared to the judicial system, the less it represented women’s point of view. “Objectivity” in the legal system had come to mean men’s point of view, she pointed out.

One can summarize the range of such feminist criticisms of what was supposedly good, maximally objective, natural and social science research by noting that sexist and androcentric biases had shaped virtually every stage of research processes. They had shaped the selection of what could count as interesting or important scientific and technical problems, and what counted as relevant concepts and hypotheses on which to focus. They had shaped the design of research processes, what counted as relevant evidence, and the interpretation of data. They had shaped the conclusions drawn from the data, and the choices of to whom the results of research were disseminated. Most importantly, women had not been recognized as legitimate participants in the situations found problematic in the first place. As mainstream researchers have taken a long time to recognize, identification and serious consultation with all of the important stakeholders in a research process are crucial to avoiding the rest of the kinds of projects listed here.⁶ Similar criticisms have been produced in antiracist, anticlass, postcolonial, and science projects of every other liberatory social movement.

The standpoint accounts proposed that in order to obtain more objective accounts of nature and social relations, researchers should start research from outside the dominant conceptual frameworks—namely in the daily lives of oppressed groups such as women. Here I focus on the “strong objectivity” proposal that emerged from the standpoint theories, though the terminology and particular way it is explained here are mine. This strong objectivity proposal has several advantages. As indicated, it starts with clear recognition of how science is actually practiced in the real world today. It does not start from an abstract ideal of what would make perfect science. Moreover, in light of this situation, it tries to identify the exact site of the main problem with conventional practices for achieving value-free research: the homogeneity of research communities, which is both “natural” (for example, only men) and trained (through disciplinary instruction). That is, such communities attract and admit only certain groups of citizens with a distinctive set of elite social values and interests, and then train them into research practices that further advance such distinctive values and interests. Furthermore, the strong objectivity proposal is focused on answering questions about the relation between the conditions of the subjects’ lives and the larger social relations that shape those conditions. Additionally, it identifies in existing achievements in women’s movement research just what the researchers did to achieve such successes, and recommends how to replicate such achievements in future research. It is grounded in existing “best practices” rather than an abstract ideal imposed from outside them. Finally,

its assumptions and practices align with insights of the research field of social studies of science and technology, an issue to be discussed below. These characteristics make it simultaneously a methodology, an epistemology, a philosophy of science, and a sociology of knowledge. Hence, the strong objectivity proposal and its standpoint approach have found homes in multiple disciplines.

The next section explains the strong objectivity proposal. Later sections clarify what it does and does not do by considering several familiar criticisms of it, and note how standpoint methodology and its strong objectivity project are aligned with important insights of the post-Thomas Kuhn (1970) social studies of science movement. This alignment (unintentionally) locates the powerful analytic tools of the social studies of science movement on the side of standpoint theory and its strong objectivity proposal. In turn, the successes of the feminist analysis provide a kind of missing case study for these features of science studies.

I should note first, however, that the standpoint accounts were not the only feminist attempts to transform the notion of objectivity so that it could function more effectively. For example, such proposals have come from physicists Karen Barad (2007) and Evelyn Fox Keller (1984), and from philosophers Heather Douglas (2009), Helen Longino (1990, 2002), and Miriam Solomon (2001), to mention the best known. The projects of these theorists differ from mine. None have *started* their projects from how knowledge is produced in the real world where corporate and state sponsors and funders shape so much of scientific research in the industrialized countries of the West, let alone around the globe. Some of them do take up the effects that such funders have on scientific work. Yet that is not the same as starting research with questions that arise from the lives of those who receive disproportionately small benefits and must bear disproportionately large costs of that real world. It is this context of everyday knowledge production, from the design and management of which women have been excluded, that shapes so much public policy that has such powerful effects on women's lives. Thus the standpoint projects intend to put desired resources for social transformation into the hands of women themselves, and into the hands of policy makers committed to improving the conditions of women around the globe.

What Is "Strong Objectivity?"

No Single Meaning or Referent for "Objectivity" First, it is important to recognize that there is no single, fixed meaning of the term "objectivity." Indeed, historians have shown how it is an essentially contested concept.

In modern societies it remains a persistent site for controversies over conflicting claims to authority—in law and social policy no less than in science. Robert Proctor points out how claims to the value-neutrality of science sometimes are used to advance and sometimes to retard the growth of knowledge. Moreover, claims to neutrality have been made both on behalf of and against democratic research tendencies (Proctor 1991, 262). Claims to value-neutral objectivity are always embedded in the larger political and social tensions of particular eras.

I have argued that the ideal of value-neutrality must be seen in political context. The neutrality of science is not the consequence of a logical gulf between fact and value, nor the natural outgrowth of the secularization of theory, nor even the outcome of the adoption of physical science methods into the social sciences. It is a reaction to larger political movements, including the changing use of science by government and industry, the professionalization of the separate disciplines, attempts to isolate science from sensitive questions of the day (*ibid.*, 267).

In addition to its shifting meanings, the term also lacks a fixed referent. Objectivity, or the incapacity for it, has been attributed to individuals or groups, such as in uncomplimentary dismissals of women, African Americans, or the indigenous knowers of non-Western cultures as tending toward self-interest and subjectivity. These people are dismissed as being incapable of producing the reliable knowledge claims that supposedly men, whites, Westerners, or some other elite group can produce. In another usage on which Thomas S. Kuhn (1970) focused, objectivity has been attributed to the particular kinds of inquiry communities that are characteristic only of modern science. Trained to hold a skeptical attitude to received beliefs, such communities must also develop principles of mutual respect and trust if such skeptics are not to suffer for articulating their critical perceptions. In such communities the lowest-level graduate student is encouraged to think critically about dominant assumptions and claims, supposedly including those of his Nobel Prize-winning lab director. Often the term is used to describe the results of research. The facts produced are objective. Yet one can wonder what this use of the term adds to assertions that these research results are highly confirmed. Here “objective” seems to be a substitute for “true” or “truthlike.” Indeed, philosopher Ian Hacking has argued that abstract terms such as “objectivity” are only “elevator words” intended to improve the scientific status of whatever is at issue.⁷

In actual research contexts, the term is often used to refer to research methods. By this is usually meant data collection techniques such as observation, interviews, surveys, archival research, or statistical strategies. But in the account here, it is *methodology*, or theory of method, that is the concern. The question is how to go about doing research that simultaneously advances the comprehensiveness and reliability of its results and also produces resources for answering the kinds of questions that are most important to an oppressed group.⁸ In the writings of the standpoint theorists, these methodology issues are often referred to as “methods” of research, but it is always clear that it is not the techniques of data collection but rather the shape and purpose of the research project that are at issue.⁹

The Core of a Commitment to Objective Research Does the term “objective” slip and slide around too much to provide clear meaning and referent? It does not. We can extract at least a shared core of commitment in these multiple meanings and referents. Objective research should be fair to the evidence, fair to one’s critics, and fair to the most severe criticisms one can imagine even if no one has yet articulated them. Of course this is the core of the conventional ideal of objective research. Thus, “strong objectivity” is faithful to the central commitments of the standard view in spite of its rejection of the value-free ideal. Strong objectivity is indeed “real objectivity”: it is more competent to achieve such fairness goals than the version of objectivity that is linked to a value-free ideal. Keeping a focus on the objectivity of research methodologies draws attention to how a certain kind of political and intellectual ideal of diversity can be advanced through a distinctive research strategy that simultaneously advances the growth of comprehensive and reliable knowledge claims.

How Should We Operationalize Maximizing Objectivity? How is the epistemic and scientific goal of objectivity made functional in research—or “operationalized,” as philosophers of science used to put the point? Good methods are supposed to be able to identify social values, interests, and assumptions that researchers bring to the research process. (And they are supposed to be able to eliminate them, as we will shortly discuss.) If a different researcher or research team repeats the procedures first used to support a claim, the same results are supposed to be found. Such a practice confirms the reliability and validity of the procedures. However, if those repeating the observations come up with different results, the cause of this difference may well be found in the values, interests, and assumptions which one or another observer or team has

brought to research. Of course it can have other causes, such as different observational or technical skills or practices, an inadvertently different population of phenomena studied, a dirty test tube, or a faulty statistical practice. It turns out to be immensely difficult to replicate research processes from one lab or field station to another (Latour and Woolgar 1979).

This procedure of scientists repeating each other's research processes certainly does work well to identify those values, interests, and assumptions that differ between individuals or teams of researchers. But in cases where social values, interests, or assumptions are shared by all or virtually all researchers in a given field—as has been the case for male supremacy, white supremacy, or Eurocentrism, for example—repeating observations within such a field will not bring shared social commitments into focus. So how are such shared values and interests to be detected? It seems that the familiar standards for objective research do not have the self-critical resources to detect such widely shared social commitments. Such standards evidently can only produce “weak objectivity.” They are not competent to produce the “view from nowhere” that conventional philosophies of science have demanded. These days, because research tends to be expensive, the perspectives that tend to prevail in research are those of already advantaged groups that can access funding. Consequently it is their economic, political, and cultural assumptions, intended or not, that tend to shape results of research. “Weak objectivity” is too narrowly focused to maximize the objectivity of research. (As we shall shortly see, in another respect it is also too broadly focused to advance that ideal.)

Start Research from Outside Dominant Conceptual Frameworks The strong objectivity program argues that starting research from “outside” a discipline can enable the detection of the dominant values, interests, and assumptions that may or may not be widely prevalent, but which tend to serve primarily the most powerful social groups. “Dominant” can be used in a geographical sense to mean “most widely used,” and that may be the sense in which some people think of modern Western science as “universally valid.” (Though scientists will mean by the latter term that, for example, the laws of physics hold everywhere in the world, not just for the interactions with nature of this or that culture.) Here the term “dominant” refers, rather, to those conceptual frameworks that primarily serve the values and interests of the most powerful groups. Thus, dominant conceptual frameworks tend to serve the economically and politically most vulnerable groups only in those cases where the values

and interests of the latter coincide with those of the former. For example, modern Western medicine has served most people's values and interests in its attention to communicable disease, since the king no less than his slave can catch the measles or HIV/AIDS. But it has not done so in its preoccupation with health problems that affect mostly rich people, or when it produces remedies that only rich people can afford.

What does it mean to start research from outside one's discipline? Of course one can never get completely outside of one's socialization into a research discipline, let alone outside of one's historical era more generally, in order to float freely above culture and history, as the conventional philosophies of science have imagined possible. No one can see everywhere in the world from no particular location at all. No one can attain "the view from nowhere" that Donna Haraway (1988) has memorably referred to as "the God Trick." But finding or creating even just a little distance from prevailing assumptions and interests can be sufficient to enable critical perspective to illuminate issues in new ways.¹⁰

How can this critical distance be located and used to maximize the objectivity of research? One important way to do this has been to create the diversity that has been missing in research communities. "Affirmative action" can turn out to provide scientific and political benefits for communities as well as for the individuals newly joining them. Of course not every kind of apparently missing "diversity" will assist in this project. We don't need to invite white supremacists, neo-Nazis, or male supremacists into research communities to advance the growth of knowledge. While their perspectives can themselves usefully be objects of critical scrutiny, we already are all too familiar with the assumptions and methodologies they use and the research results their perspectives tend to produce. Indeed, it is their assumptions that too often have so deeply permeated prevailing research standards that strong objectivity is required to identify and dislodge them. Rather, it is the perspectives of economically, politically, and socially oppressed groups that can bring valuably novel insights to research projects. So the strong objectivity project problematizes the uncritical recommendation of mere diversity of human bodies—mere multiculturalism—in scientific communities. That is a widely held liberal position that fails to recognize just what is so scientifically and politically valuable about thinking from the lives of oppressed groups. Mere diversity doesn't have the theoretical and analytic resources to capture what is so valuable about "missing perspectives."¹¹

Another strategy has been to form alternative research communities. All of the recent social justice movements have pursued this project. These two strategies have often combined in the institutionalized

structure of disciplinary organizations in the United States. The standpoint of poor people, of racial and ethnic “minorities,” of people in other cultures, of women, of sexual minorities, and of disabled people are perhaps the most widely used diversity standpoints from which dominant knowledge claims in every discipline have begun to be reevaluated. Such groups have not been the ones who designed and today maintain the dominant institutional policies and practices that disadvantage them. Such institutions do not provide disadvantaged groups with the knowledge and power they need in order to manage their own lives in their own terms. Consequently, like “the stranger” in the classic sociological narratives whose perspective can identify things invisible to “the natives,” researchers “from below” can bring a focus to features of the dominant economic, political, legal, educational, ethical, and family institutions that the dominant groups either can not or refuse to recognize (Collins 1991).¹² Moreover, national differences often become visible in international disciplinary organizations. These days, many of the deep cultural commitments of the modern West in its sciences and their philosophies are also finally becoming visible in the West. We are beginning to learn how to respect critical perspectives on the West that arise from the point of view of other cultures’ situations and their legacies. Postcolonial science and technology studies has been especially helpful in this regard (Harding 2008, 2011).

Which Values and Interests Advance the Growth of Knowledge? However, it is not enough simply to be able to identify culture-wide assumptions that shape our own research projects. Strong objectivity also demands interrogation of just which cultural commitments can advance growth of the kinds of knowledge a particular community desires. Weak objectivity has been too narrowly focused to detect the values and interests that most powerfully shape research. Yet in another respect it has been too broadly focused to maximize objectivity. It demanded that all social values and interests originating outside research processes be eliminated from them. Yet in our real world, it cannot be that all useful knowledge that social communities might want can be produced by sciences funded primarily by profit-making corporations, militaries, and imperial governments. Researchers may themselves (at least theoretically) be completely free of oppressive social values and interests, and yet find that their interests in so-called pure science and so-called basic research lead them to do research that clearly advances the values and interests of their sponsors and funders. This situation created the enduring drama of the dilemma of the physicists who worked on the atomic bomb proj-

ect. After all, if sustainable environments, the worldwide eradication of poverty, and the elimination of political, economic, and social inequality were actually the values and interests of the dominant groups, and not just what they claimed to believe important when caught in practices that deteriorated movement toward such goals, those threats to human flourishing would have been eliminated long ago.

Societies with different values and interests have in the past, do now, and will continue to produce reliable knowledge claims that conflict with other claims emerging from dominant Western interests and values. Particular kinds of societies are co-produced with the particular kinds of sciences they want: each enables and limits the other. This insight emerged from all the antiauthoritarian social movements of the 1960s and from newly decolonized states. It has subsequently been articulated by the field of science studies, to which we will shortly turn. The values and interests of antiauthoritarian, pro-democratic social movements appear to be promising candidates for research communities to call upon in order to increase the comprehensiveness and reliability of research results.

A Logic of Inquiry So this is the “logic of inquiry” that begins from recognition of how today’s natural and social sciences are in fact deeply entangled in everyday social and political policies, and practices, and especially those promoted by corporations, militaries, and nationalisms—by the most powerful forces within states and around the globe. Our sciences are by no means value- or interest- free. The research projects that even the very best-intentioned scientists find interesting and can get funded (and most scientists are well-intentioned) tend to align with the values and interests of those powerful institutions. Thus, regardless of the intentions of scientists, scientific research has become linked in only a pale and fragile way with democratic social movements when it is sponsored and funded by such institutions.

Some readers may bristle at using the language of “logic of inquiry” to characterize standpoint epistemology and methodology. That phrase is associated with logical positivists’ attempt to achieve a “rational reconstruction” of what they took to be modern Western science’s distinctive ontology and method of inquiry. They intended to draw a sharp border between the “context of justification,” where hypotheses were rigorously tested to eliminate value commitments that might have slipped into scientific thinking, and the “context of discovery,” where social values and interests clearly shaped which problems were considered worthy of scientific examination, what the favored concepts and hypotheses would be, and the design of research projects. The reliability

of research results could only be increased by keeping clear the importance of this distinction through rigorous supervision of, and only of, the context of justification. Scientific creativity would be suffocated, they thought, if there were any attempts to police the context of discovery. After all, think of all the insights that originated serendipitously, such as X-rays, that turned out subsequently to be valuable.

Such projects have for some time largely been openly abandoned by philosophers of science, even though much of their spirit continues to enliven thinking in philosophy and in research disciplines, creating a horizon of reasonable thought about scientific methodology that has been hard to move beyond. The very term “logic” suggests a unique thought procedure or model of rationality to which there are no reasonable alternatives. The project of this book is positioned against such assumptions and practices.

Yet we use the term “logic” in an everyday way to mean simply a reasonable procedure: “There is a logic to the reason why the squirrel buries his acorns in my flowerpot.” I am arguing that standpoint methodology in fact proposes another, different, reasonable procedure for conducting scientific research. Starting off research from the questions that arise in the lives of groups that are excluded from participating significantly in the design and management of our social institutions and practices permits us to recognize new and valuable—often to us privileged groups also—questions and procedures for answering them that did not, and perhaps could not, occur to people from the groups who did design and manage our social worlds. So, I am arguing, we have here another “logic of scientific inquiry.” There is no reason to give up the powerful term “logic” just because we now think that logical positivists were mistaken in taking their rational reconstructions of scientific processes to describe the one and only reasonable kinds of such processes.

One further issue: What is the relation of standpoint methodology to disciplinarity? It initially emerged from several disciplines, as indicated earlier: sociology of knowledge, sociology of science, political philosophy, epistemology, philosophy of science. Overtly it is critical of conventional disciplinary frameworks. However, its practitioners tend to use it to criticize the particular frameworks of their own disciplines. They want to transform sociology, social and political theory, epistemology, or the philosophy of science, among other disciplines, so that they serve women’s interests and desires, for example. Consequently, standpoint methodology can take different forms in different research contexts as it engages with particular disciplinary histories of theory and practice focused on relations between experience and knowledge, society, and

science. In this sense it is deeply disciplinary. Indeed, practitioners in one discipline frequently seem unaware of standpoint theory's career in other disciplines.¹³ It is also multidisciplinary, since its practitioners regularly use insights from feminist work in at least several other disciplines to strengthen their arguments against the particular assumptions of their own disciplines. In whatever discipline it functions, it opens up new possibilities for debate about the relations of experience to knowledge, as social theorist Fredric Jameson (2004) has put the point. And because it does so in a methodological way, it is also a transdisciplinary logic of research. So, to summarize, standpoint methodology is antidisciplinary, deeply disciplinary, multidisciplinary, and transdisciplinary.¹⁴

It is also an *organic* epistemology and methodology. Whether or not the language of standpoint and strong objectivity is used, every oppressed or marginalized group "stepping on the stage" of local or global history tends to say something like, "From the perspective of our lives, things look different." And then they go on to organize the development of answers to the questions that are important to them, so that they can flourish; they seek to become a group "for itself" rather than only "in itself," as Marxists put the point. This organic quality helps to explain why standpoint approaches to the production of knowledge have independently appeared in one social movement after another in the last half century: the US civil rights movement, the anti-apartheid movement in South Africa, poor people's movements around the globe, the lesbian, gay, bisexual, and transgender movements, the disability movements, the recent Occupy Wall Street movement, and the Arab Spring uprisings. In each case, groups have organized to promote the production of answers to the questions about nature and social relations that have been important to them. In the process, greater diversity in the production of knowledge has greatly increased the comprehensiveness and reliability of everyone's knowledge, and this research methodology has in turn produced powerful resources for diverse progressive groups.

Shock! What a change from the relations between scientific research and social and political interests that were imagined by the logical empiricists (logical positivists) who created modern philosophies of science during and after World War II. In their world, race- and class-based sciences had become a huge problem. Nazi science, articulated in the Holocaust, was race-based, and Soviet science, articulated in the Stalinism of the collectivization of peasants and the hideous punishments of the gulags, was class-based. How could these philosophers and scientists and their students from the 1950s and 1960s, the latter of whom are

now senior faculty in philosophy, natural science, and social science departments, think that the “diversity” tendencies in contemporary politics and philosophies of science are a good idea? New ways of thinking about this particular issue in the history of the philosophy of science are examined in chapter 5. But it will be valuable to pause at this point and briefly review the most common criticisms of standpoint methodology and its strong objectivity program, as well as the responses that standpoint theorists have made to these criticisms.

Criticisms and Challenges

This notion of strong objectivity and its standpoint methodology has disseminated widely across disciplines. As indicated earlier, the practices have also independently emerged wherever social justice movements claim authority for the distinctive ways in which they see the world. In the United States and Western Europe, both standpoint methodology’s fans and its critics have sometimes tried to fit it into methodological practices and epistemological positions already familiar to them. This tendency frequently misreads both the strengths and limitations of this approach. Alternatively, critics can tend to fault the standpoint approaches for not grounding their claims in precisely the older philosophies of science to which standpoint methodology and its strong objectivity object. Additionally, a number of the criticisms that were raised in its early years have since become moot. In some cases it is now generally understood that the critics of standpoint approaches misrepresented its claims. In response to such critics, standpoint theorists have more carefully articulated their claims. Yet other critics have raised interesting questions that cannot yet be settled.¹⁵ Here I will summarize the main criticisms of standpoint theory that are raised by antifeminists, as well as by adherents to other feminist epistemological and philosophy of science approaches, and the responses to them.¹⁶

Does the strong objectivity program introduce politics into otherwise value-neutral sciences? No. It identifies how prevailing politics has already directed research projects and how it shows up in the results of research. And it shows how some other kinds of politics (anti-male-supremacist, anti-white supremacist, etc.) can in fact advance the growth of knowledge.

Does the strong objectivity program advance an “identity politics?” Several questions can be intended here. One is whether strong objectivity’s procedure of “starting from women’s lives” (or the lives of some other oppressed group) assumes that women share some set of values or

experiences, and thus an identity. In some cases, researchers may indeed make such an assumption. But there is nothing in the “logic” of standpoint methodology that demands this feature. Note that it is always some particular subgroup of an oppressed group from which researchers are to start off their projects—for example, mothers incarcerated in federal prisons in the United States, or women graduate students at tier 1 universities in the United States. Assumptions about what this particular subgroup of women shares may be warranted or not. Obviously attention to economic, political, social, cultural, and other differences between women, their values, experiences, and identities, is crucial for the reliability of research results.

Another misunderstanding here can be that standpoint approaches hold that the knowledge claims made by members of oppressed groups are always correct; that they are incorrigible.¹⁷ But no knowledge claims can gain automatic assent. Standpoint claims are as corrigible as any others. Recollect that the unreliability of a knowledge claim cannot be established by showing that the researchers had any particular motives or interests in producing it. As noted earlier, many reliable knowledge claims are produced by research funded by corporate and military research, not to mention health, environment, and other obviously highly motivated concerns.

Yet another misunderstanding is to think that only those who are themselves members of a particular oppressed group can develop and use a research or policy standpoint that comes from that group. For example, only Latinas, or Muslim women, can develop research projects that start off from the everyday lives of people in those particular groups. Yet Latinas differ from each other in class, ethnicity, sexuality, nationality and other ways—and so, too, do Muslim women. Is each of us the only reliable expert on our own life? If this were so, social science would be impossible. Moreover, historians and therapists, not to mention Marx and Freud, inform us of the many ways in which we can not even claim to be experts about our own lives! In the case of the anti-authoritarian social movements, the very point of developing such standpoints was to change the consciousness not only of members of the group itself,¹⁸ but also of others who might be convinced to see social relations as oppressed peoples do. Whites and African Americans who were highly educated and/or who had already been voting were recruited to join the civil rights movement in the 1960s, not just those who suffered the most extreme deprivations created by white supremacist policies and practices. Of course these recruits could not have the *same* experiences as the standpoint initiators. Nor would they be as sensitive to the more subtle

forms of discrimination and oppression that the standpoint initiators experienced. Yet oppressed groups *want* the rest of us to start thinking and researching from daily lives that are not our own when we do research and make policy about health care, family practices, educational policy, and other issues. They *write books* and file lawsuits to change how everyone else thinks and acts. Feminisms always have *wanted* men to learn to think about their own behaviors from the standpoint of women's daily experiences, not through the male-supremacist stereotypes that have directed so much public policy and practice as well as behavior in intimate relations.¹⁹

Standpoint theory does argue that researchers who seek out the perspectives of economically, politically, and/or socially vulnerable groups that have not designed and managed the dominant institutions, their cultures, or their practices can gain an important source of new research questions, and new information and insights that increase the scope and reliability of their research results.

Can strong objectivity be relevant to the natural sciences? Don't they already have adequate safeguards against social biases? Such critics presume that social and cultural elements of research are always eventually winnowed out, leaving the resounding successes of physics, chemistry, and biology as "pure science" or "basic research." Certainly a lot of such removal of social and cultural elements does happen in the life of a research project and its knowledge claims. However, studies by sociologists, historians, and ethnographers of how research is organized and how its results are produced in biology, medicine, environmental studies, engineering, and even physics and chemistry have shown how these processes, too, are co-constituted with their social orders and will share distinctive social features with them. To be sure, one should not expect to find the kinds of now obvious social features in the more abstract sciences that are easily visible in the sciences that focus on human relations. But the former are still co-constituted with their social orders. They, too, can benefit from questions arising "elsewhere," as critiques by later generations and ones posed by observers from other cultures have compellingly demonstrated. Yet social justice movements cannot wait for the large-scale social transformations that will enable the detection of widely held erroneous assumptions that support what are now powerful inequities. Rather, they hold that such transformations must themselves be hastened by challenges to false and oppressive knowledge claims.

Is strong objectivity too modern? Is it too postmodern? Does strong objectivity retain too much of the Enlightenment, or positivist, or logical empiricist conceptual frameworks? Or, alternatively, does it abandon

concerns for truth and the reliability of scientific knowledge claims? The prevalence of both criticisms reveals that standpoint methodology is doing something different from the principles of both camps (Harding 2004). It does not give up Enlightenment, positivist, and logical empiricist concerns that research should be fair to the empirical evidence, to its strongest critics, and to the highest ethical principles and the goals of social justice, as indicated earlier. Of course what counts as fair in each of these cases has differed from generation to generation, and from culture to culture. Standpoint projects importantly advance Enlightenment goals as these make sense for our world today.

Yet the updated “modern” that is the goal of the social justice movements is not the modernity that was cherished in the 1950s, let alone in earlier eras. Thus, stalwart devotees of the Enlightenment and its modernization theory have often not been happy with standpoint theory and its strong objectivity attempts to move past older notions of the modern. Yet, as I have argued elsewhere, postmodern critics often ironically make certain kinds of *modernist* assumptions that standpoint projects challenge. For example, in their rejection of philosophies of science, these critics, too, assume that there can be one and only one set of institutions and practices to which the term “science” can apply. They assume, along with the positivists they criticize, that only modern Western science can count as science. They are unfamiliar with the postcolonial science studies discussions, or with mainstream Western science studies (Harding 1988). For these reasons, discussions of whether standpoint theory and its strong objectivity are too modern or too postmodern tend to be mainly confusing, in the view of this observer.

Does strong objectivity embrace or fall into relativism? Does strong objectivity endorse the position that every group is “its own historian,” as prize-winning historian Peter Novick (1988) despaired? Novick was discussing how the discipline of history was losing its coherence through antiauthoritarian challenges to the very standards of value-free objectivity that had enabled history to professionalize and become a discipline. Does strong objectivity abandon the importance of truth, value-freedom, and universally valid claims and practices about nature and social relations? In my opinion, there are two acceptable ways to answer this question. One is to argue, as I have argued above, that strong objectivity standards simply recognize realities about nature and social research practice that could not be detected in earlier eras. For example, there is no “view from nowhere” position that ever could exist from which one can see every social and natural reality in the past, present, and future. So one must take advantage of the distinctive kinds of knowledge

that can be produced from previously disregarded starting points. As indicated earlier, new human desires for knowledge are forever emerging, the world is too indeterminate and too complex to permit such a “total” understanding of nature and social relations, and nature keeps appearing to us in surprising forms. Think of tectonic plates, ozone holes, melting ice caps, “dead” areas in the oceans, and retro viruses. (This issue is pursued in chapter 5.) So such new apparent truths require new kinds of scientific standards and practices. Again, the reliability of a knowledge claim is not dependent on the motives for producing it.

But at this point, one could use the term “principled relativism” to refer to standpoint theory and its strong objectivity, as did Frederic Jameson (1988). Strong objectivity is not committed to all knowledge claims being equally valid; it is not committed to “anything goes,” as Paul Feyerabend (1975) put the methodological point. It is committed rather to “situated knowledge,” in Donna Haraway’s (1988) words.²⁰ That is, it is committed to the inevitability of deeply conflicting knowledge claims, each trailing impeccable evidence in the eyes of its holder. Yet the situations of such knowers always both enable and limit what they can know. In support of such a position, we can recollect that most research in the natural sciences is “mission directed” to improve health, generate greater profit, produce effective weapons, defeat global warming, and so forth. Yet no one thinks the results of such research invalid because the projects were undertaken for such human purposes. As we will see in chapter 5, it is harder for issues about relativism to arise if we can also block questions about scientific realism. With that teaser, I leave further discussion of this point for chapter 5.

Is strong objectivity too Western? Is it too white? Of course the epistemology here in this volume has itself been produced at a particular time and place for specific purposes and within the discourses available to its creators and users. Philosopher Uma Narayan (1989) points out that the validation of women’s experience, on which Western feminists insist, cannot carry the same kind of critical edge in a society where women’s different experience is already validated. She points to Hindu society, where the genders are conceptualized as having complementary rather than hierarchical relations. Women are not lesser than men in this kind of gender system; men and women are simply different from each other. Of course such societies can and do oppress and exploit women no less than societies with hierarchically organized gender. Yet Narayan’s comment suggests that some other epistemological and methodological strategy is needed for feminist work in such circumstances.

Moreover, Narayan notes that standpoint theory and strong objectivity were developed in opposition to positivist norms in Western research. Yet positivism has not had the hegemonic status in other societies, such as India, that it has had in many Western natural and social sciences. Indian feminists face other problems with their local research establishments, and need different epistemic and methodological tools for their projects. Confirming this perception, Chela Sandoval (1991) has developed a form of standpoint methodology that she finds more useful for US women of color, and Patricia Hill Collins (1991) and bell hooks (1990) have given it distinctive transformations to serve their needs as Black feminist theorists.²¹

Indeed, it is clear that there are a number of other distinctive cultural assumptions that shape much Western feminist work. For example, few feminists have critically examined the distinctively Christian and Protestant religious and spiritual commitments that have been identified as being embedded in a Western secularism which is also a foundational commitment of Western sciences and their philosophies and methodologies, including feminist varieties. We return to this issue in chapter 6.

Finally, Third World US feminists and feminists in other cultures find useful critical tools in their own traditions, as Sandoval, Collins, and hooks demonstrate. The standpoint methodologies and strong objectivity program developed in the US and in Western Europe can be useful outside such contexts, but they cannot be the only such useful feminist methodology.

These criticisms and the responses to them indicate how figuring out the most useful articulation of standpoint methodology and its strong objectivity project has been and remains a work in progress. Its proposals run counter to deeply held beliefs about the appropriate relations between science and society, knowledge and experience. Yet its fundamental perceptions and claims can be supported also by noting their alignments with arguments emerging from the social studies of science and technology over the last half century.

Alignments

A number of the insights and strategies of standpoint methodology and its strong objectivity program align with those of the social studies of science and technology research field (SSST) that was started off by Kuhn's *The Structure of Scientific Revolutions* (1962) and by the work of sociologists of science such as Jerome Ravetz (1971).²² I say "align with" since in the past the SSST has only rarely raised issues about the

implications for its own science projects of pro-feminist, multicultural, or postcolonial political and scientific goals.²³ The recent studies of “sciences from below” that use a standpoint methodology, whether or not it is so named, can seem to have little in common with the laboratory studies that were so innovative in the first generation of sociologies, histories, and ethnographies of the natural sciences. Indeed, the field of SSST has been slow to see the relation of postcolonial and feminist studies to their iconic lab studies, let alone see them as being capable of making important contributions to the kinds of themes on which SSST has focused. And this is so in spite of iconic early analyses by such scholars as Donna Haraway (1989), Evelyn Fox Keller (1983), and Sharon Traweek (1988).²⁴ Was this iconic status of laboratory studies partly responsible for the disinterest in the anti-authoritarian social movement science studies work? Those studies were immensely illuminating. Yet postcolonial, antiracist, and feminist work has been marginalized, at best, in the ways in which the field presented itself—for example, in its series of handbooks and readers.²⁵

Fortunately, the field is currently in the midst of a thoroughgoing transformation in this respect. Recently there has been a welcome participation in the disciplinary organization of this movement: the Society for the Social Studies of Science (4S), composed of scholars from around the globe focused on non-Western perspectives on the social production of science.²⁶ Yet, I am arguing, the field had earlier arrived at insights that in important respects are in a mutually supportive relation with analyses from the anti-authoritarian social movements. Here I identify just four of the science studies arguments with which the standpoint methodology and its strong objectivity program align.

Objectivity Is Dynamic; It Has a History One such alignment can be found in the evidence that objectivity ideals and the favored strategies for achieving them have social histories; that is, they change in response to shifts in scientific methods and goals, as well as from processes in and pressures from society (Daston and Galison 2007; Jasanoff 2004, 2005; Novick 1988; Porter 1995; Proctor 1991). Historians Lorraine Daston and Peter Galison show how standards for objectivity shifted as new technologies of observation were introduced in the production of scientific atlases over the last several centuries. For example, the introduction a century and-a-half ago of photography and other mechanical transcribers of nature’s regularities enabled a new notion of objectivity, which Daston and Galison refer to as mechanical objectivity. With this shift, objectivity became detached from the goal of being “true to

nature” that had characterized the earlier beautiful engravings of plant species, for example, that one can find in atlases.

In this account, objectivity thus becomes one more feature of research ideals to lose its aura of universal validity and become located in particular historical contexts.²⁷ Thus, a recent emergence of practices of strong objectivity in the context of increasing demands on states and their sciences for accountability to the needs and desires of social justice movements can be contextualized as just one more such moment in the history of this research ideal. Showing that objectivity has a history is an example of the more general trend in science studies to “deconstruct” the supposedly universally valid ideals of Western philosophies of science, thus identifying their historical specificity.

Sciences and Their Societies are Co-Produced or Co-Constituted A central theme of SSST has been mentioned already in chapter 1. Steve Shapin and Simon Schaffer (1985) introduced into SSST the image of the co-constitution or co-production of sciences and their societies. They did so with their study of the correspondence that took place between Hobbes and Boyle as these two influential figures struggled to bring into existence distinctively modern democracies and sciences respectively. Subsequently, Sheila Jasanoff (2004, 2005) demonstrated how different national anxieties and political cultures required different strategies to secure the objectivity of biotechnology decisions in Germany, England, and the United States. In Germany, memories of the hideous political and scientific decisions of the fascists have made leaders of the scientific community especially anxious to insure that every kind of stakeholder is represented in the initial design of biotechnological research. “Never again” is their motto. So maximizing objectivity requires that researchers exert great effort to get critical perspectives on such research designs from every kind of group that might be affected by the research results. In England, maximizing objectivity requires that the heads of research teams be scientists with long and successful experience in the relevant kinds of research and with impeccable ethical character. In the United States, risk assessment and its quantitative research results are regarded as necessary to maximize objectivity because dissatisfied people in the United States often take their complaints to law courts, and this kind of evidence tends to be most compelling for convincing juries. Thus, Jasanoff showed that the scientific institutions and practices of different societies can exhibit different standards for maximizing objectivity or, at least, different practices to reach maximal objectivity in a particular local political context.

This language of co-production and co-constitution of sciences and their societies was a welcome replacement for the earlier language of the “social construction” of science, which had emerged in the early days of the development of the social studies of science and technology. The co-construction language had an even better fit with Thomas S. Kuhn’s argument five decades ago that the very best sciences exhibited an “integrity” with their historical era—that they made the kinds of assumptions and focused on the kinds of problems that were characteristic of their particular social moment, but not necessarily of earlier or later ones (Hollinger 1996; Kuhn 1962). Such sciences might be autonomous from their societies in the sense that no economic, political, or social authority was explicitly directing their agendas. Yet this kind of autonomy has gotten scarcer in recent decades, as research has become more expensive and as information has increasingly become the most important “capital” of the global political economy. But even with this kind of autonomy, sciences have still shared with their societies values, interests, and, one could say, foci of curiosity that were distinctive of the era. However, ensuing discussions of the social construction of the very best scientific knowledge have misleadingly seemed to suggest to some participants the claim that nature played no role in such social constructs of science. Of course no SSST researcher ever held such a silly position. The constructivist discourse also misleadingly suggested that “the social” somehow existed outside of and prior to scientific projects. Instead, the co-production theorists argued that the social and the scientific were always continuously in the relation of providing resources for each other. Any science was always fully inside its society, and any society inside its sciences. This is not to say that sciences were socially determined “dupes” of their historical moment, but only that they tended to participate in the various concerns of their historical era.

Yet well before the Shapin and Schaffer account, antiracist, feminist, and class theorists were already arguing that discriminatory and less than maximally reliable results of research were the expectable outcome of sciences supported by powerful groups in hierarchically organized societies. Moreover, such sciences would tend to provide further resources for the dominant groups in such societies. They insisted that it would take changes in these unjust social orders to legitimate sciences that were more accurate and that better aligned with democratic social relations, and that such sciences would in turn help to transform such societies.²⁸ Similar arguments appeared in the postcolonial science studies literature that was available in English by the early 1980s. Unfortunately, with important exceptions, this postcolonial work has remained mostly under

the radar of mainstream Western science studies. So the co-constitution/co-production understanding of how change occurs simultaneously in sciences and their societies is aligned with standpoint methodology and its strong objectivity ideal. This co-production work showed the internal relations between how we live and what we can know—between being and knowing. It challenged the older understanding of the history of scientific achievements as being about either the internal “logic of science” or about how external social, economic, and political forces had effects on scientific practices. That is, it refuses to fit into the categories of internalist or externalist histories of science. In these newer accounts, “the social” reaches deeply into what were thought of as the foundations of our knowledge of the world, a point to which I return. Because of this dynamic nature of sciences, their borders continually shift. What counts as nature or as “real science” in one era frequently is at odds with the commitments of another era. Of course the same is true for what counts as a multicultural democratic society.

Multiple Scientific and Technical Expertises Harry Collins and his colleagues (2007) have argued that scientific expertise has been far too narrowly restricted. It tends to exclude lots of nonprofessionals whose *experiences* enable them to “know what they are talking about.” Wouldn’t the producers and users of indigenous knowledge qualify here, as will be addressed in a later chapter? Wouldn’t women’s knowledge of our bodies, of the needs of our dependents, of the local environments with which we interact in the work we do also qualify? Relatedly, Ulrich Beck (1997) has argued that today the production of scientific knowledge is being “demonopolized” from the control of official scientists in a variety of ways (Harding 2008). David Hess (2007) and Karin Backstrand (2003) have charted the importance today of many kinds of “civic science” and “citizen science” in which nonscientist citizens engage in formulating questions for inquiry, advocating for funding of such research, sometimes collecting initial data themselves, and a host of other aspects of the production of scientific knowledge.²⁹

Revaluing Intervention A related focus in science studies has been on how Western philosophy of science has tended to overvalue representing nature’s order at the cost of an adequate appreciation of the importance of scientific intervention in it. So argued Ian Hacking (1983) in an influential study. This argument undermines the claimed superiority of theoretical scientific achievements over practical ones, and thus of scientific over technological innovation. On this account, knowing how

is much more important than philosophers and scientists preoccupied with “knowing that” could recognize. Recently a few philosophers of science have started from the lives of indigenous knowers to identify the practices that have so powerfully advanced their knowledge systems.³⁰ Again, this work uses the standpoint methodology, without so naming it, to achieve greater fairness to available evidence of non-Western cultures’ knowledge systems.

I have been arguing in this section that although the standpoint methodology argument may appear unfamiliar to philosophers and to the field of the social studies of science,³¹ several central themes in the field of science and technology studies do in fact align with the standpoint claims. Such alignments can give support to the reasonableness of the standpoint arguments. And they can draw attention to the silence in the science studies accounts about the relevance of the feminist and post-colonial work to such science studies projects.

A New Harmony of Multiple Conflicting Sciences?

What kinds of sciences do we want for today’s multicultural, democratic societies? What kind do we want for a West that is already encountering repeated “decentering” in today’s global political economy? These are not the issues faced by the influential philosophers of science of one and two generations ago. Yet many of us share with these intellectual and political legacies commitments to developing more fair and socially responsible societies and the kinds of sciences that can serve such goals. We share the desire to work cooperatively in local and international contexts. We share the valuing of knowledge of how our worlds actually work—of what are their regularities and underlying causal tendencies. We can commit ourselves to a new kind of “world of sciences” through strategizing how to maximize and harmonize the scientific and political benefits of multiple scientific questions, conceptualized from multiple social perspectives, with a multiplicity of useful methods. Such harmonizing must never aim for a single “theory of everything”; it must not aim for a “singularity,” as will be discussed in the following chapters, since working toward such a goal always results in the silencing of dissenting voices. Rather, the “harmony” desired must always be partial, tentative, and fragile, and must be created through negotiation and compromise. Of course negotiation and compromise already occurs within the everyday practices of Western sciences themselves. Perhaps the conflict negotiation literature that is so useful in improving labor relations, international relations, and marital relations could benefit philosophies of

science also! To be sure, we all understand that we want our airline pilots and heart surgeons justifiably confident that they are doing the absolute best possible under the circumstances they encounter. We want them to hold the closest anyone could come to absolute, universally valid truths, even if we know that none such are in fact possible, and that all scientific method can ever produce are claims that we judge to be less false (for the moment) than the others so far tested.

Just how we could succeed at such goals in today's world requires public discussion in local and global contexts. Unfamiliar terms and concepts can become comprehensible through public discussion of their benefits and limitations. (Think of genes, tectonic plates, biodiversity, ozone holes, black holes in space.) Since we now can see that sciences and their societies are co-constituted, we can try starting from the society side of the co-constitution in today's social justice movements to identify research ideals and strategies that address progressive, though multiple and often conflicting, science and politics goals. Adopting such ideals and strategies will, in turn, advance both sciences and their societies. Such projects raise puzzling questions, but those are the relevant ones on which we could focus. Strong objectivity and its standpoint theory provide one useful way to begin such projects.

3

Women, Gender, Development: Maximally Objective Research?

Women's Movements Research

The women's movements that formed beginning in the late 1960s challenged the objectivity of dominant public policies that discriminated against women in the law, in politics, in education, at work, and in the household. They also criticized the natural and social science research that made sexist and androcentric assumptions appear reasonable to policy makers. This feminist work was one of many research projects produced by the anti-authoritarian social movements that demonstrated how the epistemic and scientific norm of objectivity and the political and social norm of diversity are mutually supporting, as has been argued in chapter 2. These norms need not be conceptualized as conflicting, as has been assumed by those committed to the requirement that objective research must be value-free in its methodology and results.

This chapter will consider just one of the many foci of feminist research: namely women, gender, and Third World development, or development in the Global South, as it will sometimes be referred to here.¹ The concern will be primarily with social science research, but the natural sciences also appear as critical targets when health,

agriculture, or the environment, for example, are the topics. Philosophy of the natural sciences is relevant in another way also, since the standards for maximizing objectivity in those fields have been so influential in the social sciences. Even qualitative research has to justify the empirical reliability of its research results under the shadow of the standards for quantitative research that were initiated in the natural sciences. In other words, social science research has had to justify the theoretical adequacy and predictive power of its results either by using quantitative methods or by developing arguments for the necessarily different standards of adequacy for qualitative methods.²

Readers might have another hesitation about the relevance of this chapter to the book's agenda. One might be tempted to think that this chapter has more to do with policy making than with social science. Examples below will sometimes come from social science research and sometimes from policy decisions. Yet we can ask whether it is still reasonable to think that there is any social science research that has no possible relevance to social policy. Not so long ago, this assumption of the possibility was little doubted. Max Weber tried to create a firm boundary between the selection of research topics and the actual procedures of research. The latter could be value-free, the former never could be, he argued (Weber 1949). Statisticians have believed that mathematics in general and statistics in particular are free of social values. Qualitative researchers have agreed, holding that some kinds of projects could be illuminated by value-free quantitative procedures, though this is not so for everything humans want to know about social relations. Yet the last five decades of social studies of science and technology have revealed the impossibility of isolating sciences from their social milieu. Sciences and their societies co-produce and co-constitute each other, sociologists and historians have argued, as has been pointed out in chapter 1. Even such apparently value-free practices as statistics have been conceptualized and organized around two quite different kinds of social projects that serve different class interests (Porter 1995). Thus, the fact that social policy always has distinctive social effects, favoring some groups and disfavoring others, often can be traced to the kinds of issues, concepts, and methodological procedures that have guided the research that informs such policy. So this chapter will focus on both the value-promoting characteristics of research concepts and practices, and on the often unacknowledged social policy consequences of such research.

Finally, before turning to the topic for this chapter, certain terminological issues must be addressed.

Terms How should one refer to the typically invoked contrasts between the large regions of the globe that are the object of the discussion in this chapter? Five different binaries have been favored in such contrasts.³ The opening of this chapter referred to First World versus the Third World, and to the Global North versus the Global South. Also used are the binaries West versus non-West (or Orient), developed versus undeveloped (or developing), and industrialized versus nonindustrialized. One might think it preferable to settle on just one of these terminologies and use it consistently. However, each of these binaries has its own particular history and politics. Each is either meaningless or confusing when used in other contexts.

For the colonial era, it is “West” versus “non-West” (or “Orient”) that has typically been used. This can still make sense when discussing residues or reinvigorations of colonial relations in later eras. For the immediate postwar period, when development institutions and policies were being put in place, “Third World” versus “First World” or “developed” versus “underdeveloped” or “developing” has been used,⁴ and it can seem preferable today. The term “Third World” was invented at the Bandung conference of “unaligned nations” to give stature to the latter in light of the First and Second World terminology that had come into use at the beginning of the Cold War. So, though it was in fact chosen by a postcolonial group, it is Cold War terminology and thus not really right for earlier or later periods. Moreover, critics of development policy contest the idea that such policies did indeed deliver development, rather than maldevelopment and de-dedevlopment, to the world’s economically “poor” societies. They also contest that the narrow, economic notion of development favored in self-references by Western institutions fails to recognize the ways in which such institutions and their policies neglect the ethical and political aspects of social development that are either already possessed or desired by so many people around the globe.

The term “Global South” was invented by activists from that area at the 1992 United Nations environment conference in Rio de Janeiro. However, it seems to fit all too well with those discussions of globalization that want to hide histories of colonialism and North-controlled development policies. It can be difficult to get the relevance of such histories recognized in discussions of globalization. Moreover, this binary can seem purely descriptive, though it isn’t. Are Japan, Australia, Native America, or Mexico in the Global North or South? It also seems to lack any relevant social or geographical reference when used in the context of the two earlier periods. “Industrialized” versus

“nonindustrialized” works pretty well in some contexts, but not in others, where its focus on industrialization is not the issue and can be distracting.

Then there’s the problem that the use of any of these binaries over-emphasizes the homogeneity of each side and under-values the hybrid, interactive nature of so much of global social relations. And the binaries cut the complexity of the world’s social relations into humongous chunks that can obscure as much as they reveal. Yet, in favor of some term of contrast to refer to hugely powerful economic and political disparities around the globe, it’s easy to lose sight of such disparities by focusing too strongly on hybridity and differences. Finally, some readers may think that we should just invent new terms to avoid all the problems with the existing ones. Sometimes “transnational” is used in this way (though it also has illuminating uses). Yet it, too, has a political history, even if it is an extremely short one. It makes no sense in most of the historical contexts under discussion here. Of course dominant discourses, whichever they are, intend to appear as the only viable ones—to be reasonable for any relevant context one could imagine. Those who gain stature through their use don’t want acceptance of critical perspectives that question what they see as their legitimately dominant conceptual frameworks. So there are nothing but unsatisfactory choices here. Consequently, my strategy will be to use whichever terms seem most relevant for the context of the discussion, with the reminder that none of them can be completely satisfactory.

Were Women Left Out of Development? Chapter 1 described the modernization theory upon which development theory, policies, and practices have depended. Scientific rationality and technical expertise were always identified as the crucial motors of modernization and its post–World War II development policies and practices. Yet women have been presumed to be less capable of human rationality in general, and certainly of scientific rationality. And women’s distinctive technical expertises in child care, household, and agricultural contexts, for example, have been excluded from what counts as real technical expertise. Indeed, it seems reasonable to assume that women cannot become modern, as a number of scholars have argued. Modernity has again and again positioned itself against the traditional, the private sphere, and the feminine (Felski 1995; Harding 2008). Thus it is positioned against both women and non-Westerners. Obviously, such assumptions have created obstacles to the ability of development policies and practices to deliver benefits to women in the Global South.

The women, gender, and development debates opened with the publication of Danish economist Ester Boserup's (1970) *Women's Role in Economic Development*. Boserup argued that women had been left out of development. They were not receiving the technical education and new kinds of jobs that were available to their brothers. However, critics soon realized that this was only the beginning of women's problems with development policies and practices. Successive waves of analysis, advocacy, and activism added issues about sexist and androcentric assumptions in how development policies were conceptualized; the necessity of also addressing issues of political, social, and environmental development in order for women and their dependents to flourish; the role of men in women's underdevelopment; and how women can organize to create development opportunities for themselves in the face of widespread resistance to such activism.⁵ By now, more than four decades after Boserup's influential book, there are voluminous and complex analyses of these issues. Yet these are often little acknowledged in mainstream development literature. With a few exceptions, such as the work of Amartya Sen (1990), mainstream development literature still often manages to ignore these accounts and the impoverishment of women that they document.

Of course such neglect greatly damages women's lives. But I am here also arguing something more provocative: that such neglect renders impossible the achievement of the stated development goal of eradicating poverty, heard in President Harry Truman's call for development programs (see chapter 1). It turns out that women's poverty is not a "special interest" that can continue to be neglected while mainstream programs succeed in advancing closer and closer toward a poverty-free world, as appears to be the assumption in mainstream work. Rather, women and their dependents are the vast majority of the poor around the globe, including in the industrialized North, and they are highly overrepresented in whatever measure one uses of the poorest of the poor. Again and again their further impoverishment seems to have been *required* for development projects to be regarded as "successful." If this is indeed the case, then the mainstream treatment of women's issues as merely "special interests" is self-defeating, not to mention morally reprehensible. Nevertheless, this absurd position is the only one, I propose, that explains the continued neglect of women's impoverishment, or only ineffective attention to it, by mainstream development institutions such as the World Bank, and by mainstream development theorists. Of course I recognize that this is a controversial claim. However, let's see what we can learn if we entertain it at least for the duration of this chapter.

Benefits for Objectivity and Diversity Concerns In addition to advancing this provocative thesis, a focus on the women, gender, and development literature has several benefits for the narrative of this book. One is that it provides examples of how feminist theory has challenged conventional assumptions about how to create objective results of research as well as social progress for women. This brings into sharp focus the limitations of conventional standards for maximizing objectivity with respect to women and gender issues. Moreover, it does so with respect mainly to social sciences: economics, political science, sociology. Natural science issues also appear when the focus is on health, reproduction, environmental, or technology issues. Yet the concern here is to show how the political norm of diversity and the epistemic and scientific one of maximizing objectivity also provide resources for each other in social science research; they need not be regarded as being invariably in conflict with each other.

Furthermore, the women's issues in focus in this literature enable critical scrutiny of effects today around the globe of the revival of modernization theory after World War II, discussed in chapter 1. The development policies created by United Nations agencies and Northern societies after World War II to bring the "underdeveloped" societies out of poverty have been the form that modernization projects have taken in the last six decades. Feminist criticisms of these policies and practices reveal the limitations of modernization theory in having positive effects on women's lives. Here one can see that these debates about women, gender, development, and objectivity have global dimensions; they have implications for policies of such institutions as the World Bank, the United Nations, and any other that claims to advance social progress for all without specifically attending to women's distinctive needs and desires.

Additionally, these debates draw attention to the fact that the category "women" is not a homogenous one, any more than are the categories "men," "humans," "citizens," or "poor persons." Women occupy distinctive locations in hierarchies of class, race, ethnicity, and sexuality, in histories of colonial relations, and in forms of modernization. Different groups of women are located at the "intersections" of each of these categories wherever they play a significant role in organizing social relations. Thus, this literature overtly invokes the "intersectionality" that became such a powerful analytic method in US critical race theory. From there, this concept has been disseminated to many other research and policy contexts (Cho, Crenshaw, and McCall 2013). The intersectionality debates confirm that while the category "women" can be a useful one in some contexts, it always obscures the importance of the other

local and global social relations in which any group of women is located and/or consciously participates. Thus, recognizing and engaging with diversity is also an issue for maximizing objectivity *within* feminism, as it should be in every other progressive social movement.

Moreover, the invocation of “intersectionality” draws attention to the fact that men, too, are always implicated in the conditions of women’s lives, and vice versa. “Gender” is not just another name for women, as has all too often been assumed. It is a social relation between groups of people, as are race and class. Gender relations can be between men and women, between women, and between men.⁶ Thus men, manlinesses, and masculinities are important participants in development social relations, no less than are women, womanlinesses, or femininities. Again and again it becomes clear in feminist analyses of the development literature that what happens to women implicates men’s lives, and vice versa. We could entitle this chapter “Millions of Men are Missing (from Accountability for Women’s Impoverishment),” to employ an influential phrase of Amartya Sen’s for different purposes. Yet this issue makes only sporadic and often problematic appearances in the mainstream development literature, as we will see when we return to this issue below.

Finally, this focus provides an opportunity to highlight the deeply self-critical nature of feminist work, which has remained one of its great strengths. In order to survive and move forward, it has had continuously to engage effectively with criticisms from both outside and inside women’s movements. Yet far too many critics of feminist analyses have engaged only with positions from long past moments in its history. While no doubt there are still some feminists who hold such antique positions, the most progressive parts of women’s movements globally have acknowledged the limitations of earlier positions and have moved past them. This process doesn’t make today’s very best feminist work immune from further criticism. It does make it much more difficult to defeat feminist work “wholesale,” so to speak—that is, while failing to focus on how particular claims and arguments have seemed reasonable to some groups of feminists at particular times and places but not at others. It is relatively easy to chart such self-critical processes in the women, gender, and development literature. Concluding this chapter with a section on tensions and quandaries in this work today opens the discussion to yet further transformations.

In chapter 2, the standpoint epistemology and methodology that explicitly was developed in the Western women’s movements of the 1970s was described, along with the methodology standards for “strong objectivity.” Such a way of doing research—a methodology—creates greater

reliability of research results as it simultaneously provides empirical knowledge of natural and social environments that women need and want. It demonstrates how the epistemic and scientific norm of objectivity and the social and political norm of diversity can provide resources for each other. This chapter shows how this has worked for the social, political, and economic theorists who are concerned with eradicating Third World poverty.

Here we take up three significant ways in which feminist work has challenged the presumed value-free and objective development research, policies, and practices. Our focus will be primarily on the work of economists and other social scientists. We will also try to stay alert to the ways in which these analyses apply to the situations of women in the Global North no less than in the Global South. We will look at feminist challenges with a focus on the following questions. Which poor people do development policies serve? Do women work? And how does women's work subsidize both capitalism and the state?

Identification, Diagnosis, and Prescriptions for Eliminating Poverty

Who Are the Poor? By any measure, the vast majority of the poor are women and their dependents, though it is difficult to find acknowledgment of this fact in mainstream development literature. How does this come about? The virtually universal assignment of family and household responsibilities to women limits the time and energy that they have for wage work. The occupations available to them tend to be those with lower wages. When they work in jobs primarily held by men, they tend to be paid less than men. In two-parent families, women rarely have equal control of the distribution of household income. Widespread domestic and public violence against women limits their abilities to access and control the resources, such as education and wage work, that are needed by them and their dependents. Increasingly large percentages of women in every society tend to be heads of households, and thus they must provision their dependents as well as themselves with the meager resources available to them.

It should immediately be noted that this phenomenon is not characteristic only of women in the Global South. It is also the case in the United States, for example. In the Global South this situation is replicated with local variations, depending on the vagaries of local traditions and development policies. No feminist development analyses deny that more women than men suffer from poverty, or that women are disproportionately responsible for the welfare of children, the elderly, and

people who are sick. At issue, rather, are the causes of this phenomenon and their apparent intractability. Debates in the development literature are focused on how the situations of impoverished peoples should be remedied, often with little attention to the distinctive causes of the impoverishment of women and their dependents.

Do Development Policies and Practices Discriminate against the Worst Off? As Thomas Pogge (2012) points out, development policy is routinely biased against the poorest of the poor. Anti-poverty programs tend to set and reset the “poverty line” in ways that increase their chances of being able to provide evidence of success, even though this is always at the expense of the poorest of the poor. How does this happen? First, these programs assess which level of impoverished people they can most easily and inexpensively resource to some level that they could refer to as being “out of poverty.” They move the “poverty line” to that point, get the designated group above it, and claim success. Yet the far greater levels of illiteracy, ill health, poor nutrition, early mortality, and lack of job skills of those poorer than that group may well be unaddressed or only marginally addressed by such an antipoverty strategy. Thus development agencies such as the World Bank set and reset “the poverty line” to just above the least poor of the poor, rather than devoting resources proportionate to levels of need, such that the poorest of the poor receive more. Since women and their dependents are always overrepresented below any declared level of poverty, this practice in fact discriminates against the poorest of poor women and their dependents.

Are Women’s Needs and Desires Relevant? Successfully addressing women’s poverty requires strategies different from those that most benefit men. It is one thing to recognize the gender inequality in the distribution of poverty. However, mainstream approaches have tended to avoid treating women’s needs and desires as revealing sources of information about how to reduce poverty. Rather, they tend to draw on false gender stereotypes in their strategies. One such assumption has been that men are the breadwinners in households. Another has been that households are internally homogenous: everyone benefits equally from any resources received by the head of the household. These assumptions are as false in the developing world as they are in industrialized countries. Feminist analyses have demonstrated again and again that policies that do not directly address the distinctive needs and desires of women in fact rarely benefit women and their dependents equally, if at all. Of course, the same has been true in the Global North, where it has required vigor-

ous struggles to get women the vote, control of their finances, research on distinctive threats to their health, adequate health care and insurance for it, access to colleges, law, and medical schools, sports training, and a host of other entitlements for which their brothers often have not had to struggle. There is nothing novel about the situation of women around the globe when supposedly progressive development policies fail to address their particular needs and interests.

Must “Equal” Mean Only “the Same?” Another facet of this issue is that all too often, equality has been presumed to mean sameness. It has taken huge struggles in the United States to secure recognition that equality must require attention to the particular conditions and needs of women, as to those of any other group. Sometimes sameness will be an appropriate way to conceptualize equality; in many other contexts it will not. One of the most important achievements in making legal recognition of equality require attention to “difference” was the success of the “equal rights for equal worth” struggle. Activists demanded that “women’s jobs” as secretaries, teachers, and nurses and in other contexts be evaluated in a way commensurate with how men’s jobs were evaluated. Thus, a secretary could no longer automatically be paid less than a mailman or a truck driver when her level of education, experience, and skill was of “equal worth” as (or, as was often the case, greater worth) than that of men at any particular salary level. In many countries in Europe and elsewhere, it is still the case that only gender equality as sameness is legally recognized. Feminist struggles are not over! Other social justice movements have taken up this issue also. The disability movement has vigorously campaigned against assumptions that the needs of disabled people can always be addressed through strategies of securing identical resources, freedoms, and liberties “for all.”

What Needs Development? From the beginning, feminist voices have argued against the classical assumption of modernization theory that it is the expansion of capitalist economic relations that most importantly eliminates poverty and advances social welfare. Feminists insisted that development must also include social, political, ethical, aesthetic, and environmental development (e.g., Braidotti et al. 1994). Critics of the development policies of institutions such as the World Bank, coming from many different social justice movements, have mounted similar criticisms. Yet it is important not to lose track of what the World Bank and transnational corporations are up to, as can happen in attempts to envision alternative notions of development in terms only of rights and

freedoms rather than also in terms of material economic resources. For example, some theorists who focus on “the capabilities approach” to development produce texts in which such major economic players in development policies are virtually absent (e.g., Nussbaum 2000; Pogge 2012). As noted earlier, policies that do not directly address the distinctive needs and desires of women rarely benefit women.

Are Women’s Reproductive Practices the Primary Cause of Poverty and Environmental Destruction in the Global South? By now many experts on population issues are aware that demographers for many decades assumed the wrong causal relations between poverty and high numbers of child-birth. It is poverty that causes high birthrates, not “overpopulation” that causes poverty. But almost none of my graduate students in courses on development are ever aware of this fact today. The media and general public remain mostly unaware of it also. A six-page *Los Angeles Times* article on the looming environmental crisis in 2012 insisted on page after page that something—*something!*—had to be done to reduce births in the Third World lest the “population bomb” continue to devastate our global environment. On the last page appeared a sentence, buried in a paragraph, noting that some analysts thought that educating women could help reduce such birthrates, but that this idea was highly controversial. In fact, such a project is crucial to eradicating poverty.

The population experts had argued that poor women’s ignorant and irresponsible reproductive behaviors were causing such poverty and environmental destruction in India, China, and other parts of the world. The solution was to teach poor women modern birth control practices, to institute policies such as China’s one-child policy with its accompanying punishments for disobedience, and to enforce poor women’s sterilization where possible. That is, women’s sexuality was regarded as being responsible for overpopulation and the destruction of environments. Poor women were assumed to be ignorant of birth control strategies. Women’s reproductive behavior was regarded as irrational since it supposedly caused extreme poverty, as well as irreversible environmental destruction, as more and more natural resources were needed to feed, house, and clothe increasing numbers of poor people.

However, advocates for the poor pointed out that in fact a high birth-rate was a rational economic practice for poor people. It was poverty that caused “overpopulation,” not the reverse, as the United Nations’ Population Council had argued. Poor people lack access to pre- and post-natal health care and adequate nutrition. They often must hold

dangerous jobs with no health or safety protections or insurance. Thus it took many births to get a child to adulthood. When son-preference was added to this collection of dangers to the health and survival of children, it was estimated that it took eight births to get an adult son in a poor family in India (Sen, as quoted by Hartmann 1995). Moreover, poor people's work is labor-intensive; it tends to require more workers to support a family in the forms of manufacturing or agriculture in which they work. Furthermore, poor people lack access to the health insurance, health care, sick leave, child care, social security, and retirement benefits that middle-class people have in industrialized societies. Consequently, poor families need more children to provide an equivalent of the social service network for which richer families directly pay or which they receive from their employers, the state, wealthy kin, or other sources. The poor need more workers to take care of smaller children, to help tend the ill, to fetch water, to do housework, and to support and care for aged parents (Hartmann 1995). It took starting research from the daily lives of poor people, and especially poor women, to bring into focus the actual causal relations between poverty and "overpopulation."⁷

Do Women Work?

In modernization and development theory, the model of the worker is of an adult male industrial laborer working for wages outside his household, in a permanent, year-round, full-time job with no children present. Feminist analysts have insisted that this androcentric model obscures the majority of women's work and the huge proportion of human labor which women do.

Wage Work First, how much wage work do women do? In most estimations of who works, a great deal of women's wage labor is discounted—perhaps even more than half (Benaria 2011; Waring 1988). Women are not counted as workers if their children are with them in the field, factory, or street market; or if they are part-time or seasonal workers; or if their service or manufacturing work is done in their households, as is the case with child care, cooking, washing, craft manufacturing, or piecework industrial manufacturing of products later sold through co-ops or to wholesalers.⁸ The criteria for most accounts of what counts as work contributing to, for example, a country's GNP are modeled on the work of an adult male working outside the household in a permanent, year-round, and full-time job, presumed unaccompanied by children young enough to need care. Only the International Labor Organization

(ILO) has managed to transform its data collection criteria to begin to capture the true amount of women's wage work (Benaria 1982, 2011).

Domestic Work Next, domestic work—housework, child care, and kin care—has traditionally been conceptionalized as “a labor of love.” It lacks most of the formal characteristics of wage work outside the household. It has no wages, no limited hours of work and responsibility, and no sick leave, vacation time, or retirement pay. There is (supposedly) no training for it; it is “unskilled labor” to conventional economists. Feminists have argued that in fact domestic work is real human work; it is socially necessary labor, and should be so regarded in policy considerations. Managing a household; caring for infants, children, the elderly, and the sick; cooking, cleaning, washing, sewing, shopping—all of this is real labor. There was a feminist “joke” in the early days of the women's movement that a man could reduce his living costs by marrying his housekeeper. Thereafter he could get for free what he had had to pay for prior to marriage. In Italy a group called “Wages for Housework” created a stir in the 1970s and '80s by demanding that the Italian state either directly pay or require employers and husbands to pay wages for the labor performed by women in their households. As that certain nineteenth-century German sociologist recognized, every factory boss got two workers for the price of one in hiring a married man; he got the man's labor but also the wife's in caring for the man's daily food, clothing, health, and social and psychological needs, and in bringing up the next generation of workers. In the United States, after much advocacy, Congress was forced to recognize that divorced wives should be recompensed for the unpaid services they had provided to the divorcing husband when they could have been working for wages and also thereby accruing additional skills as well as retirement security.

Moreover, as Elson and Pearson (2011) have pointed out, the women's “unskilled labor,” so valued by industries because of the low wages it can justify, in fact is not unskilled at all; it is highly skilled. Young girls are trained in the skills required for this labor in their mother's households. For a girl, growing up in a household provides the same kind of “entry-level” work training for supposedly “unskilled labor” jobs as her brothers obtain through apprenticeships. Daughters are “apprenticed” to do in the private sphere the child care, cooking, cleaning, sewing, and “nimble-fingered” industrial work for which the category “unskilled labor” is used to keep down the wages when they enter the public sphere. For firsthand evidence of this fact, try getting such skills out of a typical

fourteen- to seventeen-year-old boy in most cultures (or, for that matter in most cases, from his father).

Caring Labor Another expansion of the concept of work has been to recognize that women's "caring" work is work. This care work includes emotional work and all the accompanying labor, paid or not, that is involved in taking care of children, family, and larger communities in nursing, eldercare, waitressing, teaching, and sex work. Sociologist Arlie Hochschild drew attention to the stress and even health hazards such work could entail in her account of how women airline attendants were forced to smile and treat in a caring manner passengers who were often demanding and abusive—and to do so for many hours at a time.

It is clear that as women in the Global North have worked more outside the household and in jobs previously reserved for men, the North has had to outsource to other groups of women the care work that these women had performed in the household and in conventional women's jobs. Since the North has a care deficit, often these are women from the Global South. Thus, for example, child care workers, housecleaners, nurses, eldercare workers, waiters, and restaurant staff in the United States and Europe are often mostly women from the Global South. Of course the absence of these women from their own families and communities in their countries of origin creates care deficits in the societies they have left. So yet other women in those societies often must add to their own workloads care for the children and sick and elderly kin of international care workers. These are often the children's grandmothers, aunts, or neighbors. Chains of women's care—"care chains"—stretching across the globe must be created to satisfy the Global North's care deficit.

It is the poorest of the poor around the world who bear the greatest burdens of the Global North's care deficits. Philosopher Alison Jaggar (2009) points out that an older socialist feminist insight now is useful for understanding the relation in global contexts of women's disempowerment in households and discrimination in wage labor. Women's vulnerability in wage labor increases their vulnerability in households, as their lack of sufficient economic resources often forces them to stay in abusive domestic relations. At the same time, the latter limits the amount and kinds of wage labor they can do. Jaggar argues that this is the process that now produces "transnational cycles of gendered vulnerability."

In the United States, of course, African American women slaves always had to devote more time and energy to their owner's children and households than they could give to their own. Moreover, poor white children were often sold as indentured servants to other families to

perform such labor. This occurred at least into the mid-twentieth century.⁹ And working-class women have long earned their living as live-in or day servants and nannies for better-off families. Recently, US families and institutions have increasingly had to turn to foreign women for such care work. Thus, a huge immigration of trained nurses from the Philippines and elsewhere, of child care and domestic workers from Latin America and other places, and of sex workers from Eastern Europe and other places around the globe has had to be imported to resolve the Global North's care deficits. These new care workers often lead precarious lives, as they tend to work alone, are grossly underpaid, and as undocumented workers are often not in a position to object to unfair labor practices. Often they exist in conditions of near or actual servitude. Consequently they are subjected to unusually high levels of mistreatment and violence, with few sources of support (Jaggar 2009; Alcoff 2009).

Sex Work Sex work, too, is a kind of "care work" that has been outsourced in several ways. One way is the "development" of sex tourism. Thailand and the Caribbean have been two such popular destinations for sex tourists. Another form is the importation of sex workers from the Global South and Eastern Europe into Europe and the United States. This is managed often by the very same groups that manage the arms and drug trades. It is permeated by exploitation and violence against women, and also against children who are sold, tricked, captured, or recruited into such work. Moreover, women and children are especially vulnerable to sexual assault in the context of armed conflict. Issues of women's "work" slide over into issues of criminal assault, both domestic and international, when sex is the topic.

Disagreements over terminology have posed difficult challenges to agencies and institutions that seek to end such forms of violence against women and children. What constitutes rape in the context of marriage, dating, or prostitution? What is the scope of the concept of "consent" with respect to what feminists have insisted are assaults? Such issues have had to be vigorously debated in the context of the US legal system, as well as in the context of prosecuting war crimes. Linda Alcoff (2009) contrasts the assumptions shaping how the nature of sexual violence is conceptualized in Western discussions and in discourses of "honor crimes" in other cultures. She reveals how the three central concepts of consent, honor, and victim are stretched in some contexts and contracted in others to accommodate significant differences in these assumptions while maintaining men's control of women's bodies. At the

same time, she argues, such a project can enable us to “learn from the discourses elsewhere toward developing an account of commonalities across contexts” (123). Women and children cannot benefit from efforts to reform development or advance social justice that fail to engage directly with such difficult issues.

Volunteer Work Finally, women tend to do a disproportionately high amount of volunteer work in the Global North and around the world. Whether through church, community, school, or other kinds of groups, children, the elderly, the sick, the poor, and victims of natural or social disaster depend on such work to provide many of their basic life needs. Indeed, as federally funded social supports have been increasingly defunded in the United States, the federal government itself has frequently called upon “faith-based” and other communities to pick up the tasks for which the federal government will no longer pay. In the Global South, structural adjustment policies (SAPs) have stimulated women to figure out how to provide for free the kinds of social supports that the governments no longer fund. Thus they have organized food cooperatives, child care cooperatives, and financial cooperatives. (Desmarais 2007; Needleman 2011; Rose 1992). This, too, is social labor that is invisible in virtually all measures of women’s work.

The elephant in the room in all these accounts of women’s work is men. As long as men are excused from carrying a fair share of the burden of care labor, it will be women who must pick up such work. We cannot survive without care, and can thrive only with loving care. The absence of men from this work is a global injustice. We return to this issue below.

Do Women Disproportionately Subsidize Development “Successes?”

As indicated earlier, the initial feminist criticism of development policies was that women had been left out of them. So the remedy was to “add women.” Provide women with the literacies, technical training, and job opportunities that were available to their brothers. While this strategy did bring some benefits to women, it failed to engage with the actual though unacknowledged relation of women to development policies. In fact, women had never been left out of development. Rather, the appropriation of the labor and land rights of women and peasants was crucial to the success of development policies from their beginnings, and it remains so today. Three moments of impoverishment of women by development “advances” have been the focus of critical analysis.

“Primitive Capital Accumulation” Again: Development Appropriates New Resources In fact, development has “succeeded” when it has done so primarily through what Marxists refer to as a continued practice of “primitive capital accumulation.” That is, it was through the appropriation after World War II of the land rights and labor of women and peasants that capitalism was able to gather more resources—labor and land—and move into parts of the globe where its presence had been minimal (Mies 1986). It is not that the imposition on traditional societies of scientific rationality and technical expertise had no impact on development processes. Rather, the advance of development projects needed the resources of more labor power and more land to mine and farm in rational and expert ways in order to achieve its successes. The “pie” of resources that capitalism needed to be able to work its manufacturing and agricultural magic had to be expanded by corporate control of more labor and more land.

The process through which European corporations in the eighteenth and nineteenth centuries had increased their capital for use in the industrialization of manufacturing and agriculture were now, after World War II, replicated on a global scale. The privatization of common lands that peasants had shared for hunting, gathering, agriculture, and animal husbandry now were privatized, and the peasants forced to scabble for a living on the least productive parts of their former commonly shared lands—the lands in which corporations were not interested. Otherwise, they were forced to emigrate to cities to find work. Women lost land that through informal legacies or actual practices had been under their control for centuries. In many cultures of the Global South it was women who were the farmers. Customary use of land constituted “ownership” in many such societies. In a series of books and articles, Maria Mies (1986) and her colleagues showed how this transformation had occurred. Mies, a German socialist feminist, used the logic of Marxian arguments to criticize both Marxian and liberal accounts of women’s role in development and modernization.

Of course this post-World War II development form of modernization had somewhat different consequences for the Global South than its earlier form had had on European countries. This is because in the process that began in the mid- twentieth century, the profits from the corporate appropriation of land and labor in the Global South were primarily going to the Global North. The South, in effect, had to compete with the already highly industrialized North for profits from its new market economies. However, the European and North American countries that had industrialized one and two centuries earlier had no such global

competitors. They didn't have to compete with an already highly developed and powerful block of countries for resources, or for the benefits of modernization. In the earlier European era, the benefits from the privatization and exploitation of rural and poor people in their own countries could stay mostly in those countries. The state and corporations in those countries impoverished mostly their own rural and urban poor.¹⁰ In earlier eras, states were bigger than corporations, for the most part.¹¹

To be sure, small middle classes were created in most of the Global South societies, and many already had small aristocratic classes. These aristocrats, whether Middle East emirates, Asian royalties, or South American aristocracies, happily volunteered or were recruited to help the corporate Global North expand its control of poor people's lives into their societies. They have mostly joined the Northern investing classes in getting to enjoy the profits created by "pimping" their poor people, especially young women, into Northern corporate projects. "Free trade zones" with low tax rates, no possibility of unionization, and exemptions from Occupational Safety and Health Administration (OSHA) and environmental workplace standards are just one of the most obvious forms of the visible complicity of local regimes with global corporations.

Were the Burdens of SAPs Distributed Equitably? The financial crisis of the 1980s revealed in a different way how necessary it was to exploit women in order to claim development "successes." When countries in the Global South were unable to pay back their development loans through the World Bank to the financial corporations of the Global North, the World Bank demanded SAPs to restore the Northern banks to financial health. These policies insisted that the debtor states end funding of the social services that they had developed through their loans. That is, their programs to increase education, health, and child care were to be ended. These "externalities," as classical economic theory referred to all social practices in which manufacturers engage except market exchanges, could not be continued if development were to "succeed." The debtor countries must instead focus all of their resources on increasing their exports in order to gain the financial means to pay back the Northern development loans.

Of course entire societies suffered when education, health care, and child support were no longer available. Illiteracy, ill health, and malnutrition affected all of the poor in such countries. These "adjustments" eliminated the possibility of poor people becoming less poor. Yet the SAPs exerted a distinctive double cost on women. First, it was women who had mainly been the waged providers of these services. They were

predominantly the teachers, health providers, and child care workers. The SAPs required that such jobs be eliminated. Thus, women lost salaries valuable to themselves and their families. Moreover, many of these women workers (nearly half in some countries) were heads of households. Their salaries were the only incomes available to them and their dependents. The SAPs forced them into both innovative survival strategies and also clearly less desirable ones, such as sex work and forms of “hard labor.” Second, women were now “free” to return to provide such necessary services in their households. No longer did they have the opportunities to develop the skills and abilities that the waged jobs had provided, let alone to enjoy the heightened sense of self-worth provided by their ability to contribute wages to their families.

The 2008 Financial Crisis A third such moment appeared in the financial crisis of the last few years. Here, too, it is becoming clear how necessary it is to exploit women’s labor—to worsen their living conditions—in order to restore national “financial health” and profits for Northern banks (Elson 2011; Ghosh 2011; Harcourt 1994; Kuiper and Barker 2006). Elson points out that from the beginning of the development policies formulated at Bretton Woods in 1944, there was a tension between the stated goals of the World Bank and International Monetary Fund and the interests of the owners of private capital. The former envisioned international flows of public finance to be focused on improving infrastructure, standards of living, and “conditions of labor” in the developing world. “It was a system with a degree of public ownership, although the voting rights were not democratically distributed” (295). However, the latter “were interested in maximizing return to their investments, irrespective of social goals” (*ibid.*). By the 1970s, access to funding had been shifted primarily to requests that met the conditions of private finance—that is, to neoliberal goals. This move resulted in the SAPs described above.

In the case of the government bailouts in banking crises, of which the 2008 crisis is the latest:

The most immediately visible costs are to the taxpayers who fund the bailouts, and to the people who lost their jobs. But the burden of excessive financial risk-taking is also shifted to the people, mainly women, who provide the unpaid care that keeps families and communities going. Particularly in poor and middle-income families, women are called upon to spend more time and effort in providing non-market substitutes for marketed goods that

their families can no longer afford to buy, and providing substitutes for public services that are no longer available. In addition, women have to seek more paid work in informal employment, where new entrants making “distress sales” tend to drive down returns (298; cf. van Staveren 2000).

Thus women’s rights and labor have had to be appropriated by development institutions in order for capitalist production processes to gather and retain the resources to expand and maintain their practices around the globe.

Unless women’s rights, needs, and desires are directly addressed by development reforms, development policies and practices can only succeed at further enriching the already economically and politically advantaged while they continue to de-develop and maldevelop—to immiserate—the most economically and politically vulnerable groups, of which women and their dependents constitute the vast majority.

Women’s Work Subsidizes the Economy and the Nation-State As philosopher Alison Jaggar (2009) has argued, a transnational cycle of gendered vulnerability insures that women’s labor continues to subsidize both the global economy and nation-states around the globe. Women’s lack of control of their lives in households makes them vulnerable to restrictions and violence that in turn reduce their ability to command equal resources in wage labor. And their lower wages and lower job mobility in turn leave them without resources to either command or escape subordination in their households. This has always been the situation of women in industrialized countries, as the early socialist feminist accounts recognized. Jaggar points out that this cycle now structures women’s work in the global economy.

Moreover, Jaggar argues that this cycle is in effect promoted by corporations and nation-states. It produces more profits for corporations that can pay women lower wages and expect less organized resistance from them. And it relieves states of the obligation to provide the kinds of social services that would enable women to escape their exploitation in households. The SAP moment makes this very clear. When the state needed funds to pay back Northern banks, it got them from the pitifully low salaries they had been paying women as teachers and as providers of child care, health care, and other social services. So the women returned full-time to their households and communities to provide for free what the state refused to fund . . . and to scabble to find enough food for them and their dependents to eat.

There are many more issues that could be used to show how the work on women, gender, and development produces theoretically more comprehensive and empirically more reliable results of research by addressing the distinctive needs and desires of poor women in development contexts. That is, the epistemic and scientific norm of objectivity and the sociopolitical norm of diversity can be used to advance each other's projects. However, it is time to identify just a few of the tensions and quandaries that appear in this literature today. It has been important for feminist research to refuse to bring premature closure to women's issues.

Tensions and Quandaries.

As indicated in the opening section, feminist work has raised deep self-critical issues about the inadequate assumptions and practices of its own work. Indeed, this self-critical attitude is one of the great strengths of feminist work. In Chapter 2, some of the most important limitations of standpoint approaches were noted, as well as some of the related ways that feminism has posed issues about the position of the researcher. Here just five unresolved tensions and quandaries are identified.

Do Liberal or Socialist Assumptions Most Benefit Women in Development Contexts? One might wonder how this could still be a relevant question these days, long after the fall of the Soviet Union, after legacies of criticisms of Marxism, and after decades of critical examination of the limitations of liberal political philosophies. Yet multicultural democratic states remain largely structured by the assumptions of social contract theory developed in the eighteenth century, regardless of how much these have been revised. And socialist theory has remained the deepest and most elaborated countersocial philosophy, regardless of the decline and fall of most states that were structured by such philosophies.¹² Powerful feminist analyses have been developed within both legacies, and the traces of those legacies are always visible in the actual policies and practices of both nation-states and international agencies and institutions.

So the most accurate short answer to this question today is "both and neither." The great strength of a liberal approach to improving women's conditions in development contexts is that it tends to focus significant efforts on what citizens are entitled to demand of nation-states, and on how to get nation-states to respond appropriately (e.g., Nussbaum 2000).¹³ Since the expansion of globalization since 1970, in large part due to the emergence of the internet, it has seemed to many observers that states have lost the ability to control some of the most powerful

global forces, such as international finance, the operations of transnational corporations, and the drugs, guns, and sex work trades. Globalization has also greatly diminished their sovereignty over economic and political activities within their own national borders. Yet it turns out that there still are important ways in which nation-states can be enticed to “do the right thing,” whether on matters of the environment or militarism, or on controlling some of the most egregious practices of corporations or international networks, such as those that sell drugs, guns, or sex work. Moreover, clever and stubborn progressive employees in international organizations, such as the United Nations, the World Health Organization, and even the World Bank, can sometimes effect significant changes in how those governance organizations see their own work and its effects, and can transform them. So liberal approaches focusing on the law, rights, constitutions, and governance can create opportunities that enable progressive transformations for women. Historically, however, these approaches have had little concern with transforming economic and financial institutions, and no interest in transforming social relations in the private sphere.

On the other hand, socialist feminist projects tend to focus directly on women’s economic conditions, needs, and desires, and on how women’s conditions in patriarchal households, families, and kinship networks disable them from maximally benefitting in workplaces outside the family, and vice versa (Jaggar 1988, 2009). They tend to focus less on how to defend women’s rights in government contexts, and more on strategizing how women can organize to resist exploitative work conditions. So both approaches can benefit women in development contexts.

Yet both approaches have limitations (Benaria 2011; Jaggar 1988). Both have had difficulty getting into focus what may well be the main site of women’s exploitation: men’s control of women’s bodies, and especially in families. It was the often maligned (unjustly, in my view) radical feminist movement of the 1960s and ’70s that clearly made visible the fact that neither liberal nor socialist feminist approaches to improving women’s conditions would succeed unless they also directly addressed the multiple forms of men’s control over women’s bodies. They focused on four such forms. Obviously, there is men’s control of women’s sexuality. This is at issue in the most intimate of sexual relations when, for example, women are not permitted to demand that their partners use condoms and, consequently, become infected with sexually-transmitted diseases (STDs) and HIV/AIDS. It is at issue when a US Congress constituted mostly of men makes decisions about women’s reproductive options. It is also worth remembering until only very recently in the United

States, a wife, a prostitute, or an unmarried “date” legally could not be raped. A wife was not legally entitled to say “not tonight, dear.” A prostitute was presumed never to have said “no.” And if a woman agreed to date a man, she was presumed to have consented to whatever sex ensued. The literature is full of other forms of men’s control of women’s sexuality. Religious institutions have historically tended to use control of women’s sexuality as a way to claim their culturally superior morality. This is evident, for example, on both sides of the current controversial international relations between the United States and Muslim countries (Shaikh, forthcoming).

Another focus has been on the medical and health industrial complex and how it profits from manipulating women’s perceptions of appropriate health and medical practices—from excessive reliance on Caesarean birth and its long resistance to midwifery and home births to excessive Valium prescriptions. Moreover, there is still wide toleration of violence against women and children, whether in workplace control of women workers, disputes over what counts as rape (MacKinnon 1983), the difficulty of controlling domestic violence, the violence permitted against prostitutes, or the difficulty of getting rapists prosecuted.¹⁴ Finally, there are the standards for beauty that the pharmaceutical, medical, and advertising industries as well as clothing and beauty product producers maintain, as are conveyed by models sporting the typical look of twelve-year-old anorexic Anglo girls on drugs (Bordo 1992). Until both liberal and socialist approaches to development issues fully engage with men’s control of women’s bodies, women cannot flourish.

“Millions of Men Are Missing!” Men’s Role in Women’s Impoverishment As noted at the end of the section on women’s caring work, the elephant in the room in all discussions of women, gender, and development is men’s lack of accountability in theorizing, designing, implementing, and reporting development policies and practices, as well as in the lived social relations where development does or would intervene.¹⁵ As long as men are excused from doing caring work, and are permitted to control women’s bodies in both the private and the public spheres, women cannot flourish or attain equality.

How should this problem of the “millions of missing men” be addressed? Several points provide good starting positions for moving forward on this challenge. One is that “gender” cannot be regarded as another word for women. “Gender mainstreaming” programs, now adopted in many international agencies and institutions, have tended to be treated as requirements to count women and, where possible, to add

them to development policies and practices. The full understanding of gender relations available in decades of feminist analyses is absent from most of these programs. It has been many decades since counting women and trying to add them to existing development projects was regarded as sufficient to actually enable women to flourish.

Another is that listening to women's voices is good, but it is not enough. Such work is important and exceedingly difficult. Yet it is also important that women and feminist analyses be highly represented in the design and management of development policies and practices. Projects to advance women's needs must be fully funded, and the political will to address the issues must be organized. The kinds of effort necessary to achieve such goals go way beyond simply "listening to women's voices," important as this latter task is. Such efforts have not been put forth in the case of the World Bank, in spite of the lip service it has given to the importance of such goals (Griffin 2009; Kuiper and Barker 2006). As Sylvia Chant (2011) reports, it is not just poverty that has been feminized; so too have antipoverty programs. The responsibility for impoverished women and their families and obligations to address such issues actively has been relegated to women. As Chant puts the point, women are expected to work for development, rather than development working to benefit women.

Additionally, unless men pitch in to do caring labor, millions of children will continue in effect to be orphaned by the death of their mothers from AIDS. As Kavita Datta (2011) points out, traditional conceptions of fatherhood must be transformed so that caring for children, not just procreating them, is regarded as truly manly. This AIDS issue is just the tip of the iceberg of the huge array of situations in which the eradication of poverty requires men to take much more responsibility for the impoverishment of women and families. The field of men's studies has been addressing this and similar issues about transforming masculinities (see, for example, Connell 1995, 2005; and the journal *Men and Masculinities*).

Furthermore, theories of social justice must take on issues of violence against women more directly. As the philosopher Linda Alcoff (2009) points out, different cultures tend to make different assumptions about the nature of sexual assault. The concepts of consent, honor, and violence are important sites of such different assumptions. Yet these cultural differences tend to share commonalities.

Claims about both "consent" and "honor," for example, in both the global North and the global South may be ultimately about maintaining dominance over women and aiding men to escape

culpability. . . . So in considering sexual violence, while one needs to look carefully at the global differences that affect what happens to whom under what conditions, we also need to watch for possible commonalities (125).

Another way to help men escape culpability is for governments to find endless reasons to refuse to prioritize prosecuting perpetrators of violence against women. Note that a public discussion is underway in the United States about how to end sexual assaults against women in the militaries, where one out of four women have reported such assaults. Since few perpetrators of these reported assaults have been prosecuted, but many of the victims have been treated badly by their commanding officers as well as by the colleagues on whom they might well have to depend for their lives, it is probable that the actual number of assaults is considerably higher than the official reports. The commanding officers have rarely agreed to bring charges against the reported perpetrators. The military officials insist that to install any civilian oversight of the military's handling of sexual assault reports would destroy the military "chain of command," which is crucial to the nation's security. In another recent case, it was recently discovered that the Los Angeles Police Department had simply warehoused many thousands of "rape kits" containing evidence against sexual assaults. The department reported that it did not have the funds or manpower to follow up on this evidence. Moreover, the three-year time limit within which to prosecute was about to start running out on these cases. Social justice projects cannot succeed as long as everything else is more important than ending violence against women.

Finally, several additional sites of resistance to addressing women's issues must directly be transformed. One is the immunity that domestic relations have continued to enjoy from critical scrutiny by both liberal and socialist development theory, as well as from the original United Nations Statement on Human Rights. Another is the resistance of established religions to challenging the forms of gender entitlement that characterize their principles and practices. A third is the consequences for men in the development agencies of legitimating official concern with such topics in their client societies.¹⁶ Professional-class men are hesitant to charge their colleagues with such practices, as the cases cited above reveal, and as the sexual assault officer on any campus can testify. They can start up hideous wars to "save brown women from brown men" in the Middle East, as Gayatri Spivak (1988) put the point (Abu-Lughod 2002). They can manage finally to call for reform

when African United Nations peacekeepers are raping African women of a different ethnicity, but they consistently lack the will to take action against men of their own classes, races, or cultures at home or in other countries.

When Success Triggers Failure: What Are the Remedies? Sometimes labor organizing does succeed in getting employers to respect the health and safety issues important to their workers, and even puts constraints on their environmental pollution. Yet, all too often, such hard-won successes are followed by factory closures with accompanying job loss for the workers. This is a familiar story in the United States, when industries located in New England and other northeastern states have moved their operations to the South, where unionization is much weaker and states are willing to give tax benefits and immunity from OSHA regulations and environmental laws (Hayden 2005). Even so, US industries have again and again outsourced whatever parts of their manufacturing processes could be achieved for lower wages and other costs. “Free trade zones” in other countries, call centers in India—the pattern is familiar. So when runaway industries depart from even low-cost labor areas in the Global South for even cheaper areas, it is clear that some other form of control of labor conditions must be found. With a long-term weakening not only of national labor organizations but also of their international networks, it is not clear what strategies can succeed. The fundamental problem is that while constraints on the movement of capital have been almost entirely removed, the movement of workers remains highly restricted. Yet the widespread street demonstrations over poverty issues and lack of democratic accountability in nation-states, which have occurred in so many places in the world since the Arab Spring and Occupy Wall Street movements emerged in the last few years, give hope that something is changing.¹⁷

Who Can Lead Women out of Poverty? Reformers of development policy and practices too rarely recognize that it is women who must be the leaders in transforming women’s situations. There are many examples where such successful projects have occurred.¹⁸ This is not a reason to excuse men from advocacy and action on issues important to women. Rather, it is another call for supporting women’s existing efforts, and for making sure that they hold main leadership roles in all development theory, policy making, and practices, whether or not the overt focus of such work is on women.

What Issues Tend to Be Obscured in Progressive Discussions of Modernization and Development? Some critics in the United States have argued that the shift by white progressives to a focus on postcolonial and globalization/transnational issues represents one more refusal to deal with the continuing legacies of slavery, and of corporate and nation-state “investment” in the lack of civil rights and economic opportunities for African Americans in the United States. When some 40 percent of African American men between the ages of seventeen and thirty-five are under the jurisdiction of the judicial system, racism is still alive and well in the United States. And this is so even when the nation can be proud of the huge achievement of blacks and whites represented by the election and reelection of Barack Obama as president. Clearly, the election of an African American president does not solve the problems of the vast majority of African Americans and other citizens of color in the United States. These issues are rarely visible in discussions of development in the Global South.

Sarah C. White (2011) has argued that the “gender lens” so often used in feminist development studies and policy all too often creates a “racial blinder.” In this context, too, development extends Western concepts of “difference” to the rest of the world. Its familiar promotion of “West is best” as the model for development has a racial dimension, as well as an Eurocentric one.

A Black feminist reference point in feminist development studies is hard to find. It would be useful. For example, US Black feminism has insisted that women of color need alliances with men. Women-only alliances are valuable, but women of color around the globe as well as in the United States benefit from working together with men against the particular forms that racism takes in gender contexts as well as outside them. Paid work for most women of color in the United States has not been a path to liberation. Moreover, while for white women the family often is their primary site of oppression; this is not the case for women of color. Rather, family has been a site for support and for resistance to the dominant white-supremacist culture. In development contexts, expertise for women of color has included the capacity to engage in the “international” as well as “local” contexts: to be international players as well as grassroots activists (*ibid.*). Within development studies, the voices of women of color can be heard in such organizations as Development Alternatives for Women for a New Era (DAWN; Sen and Grown 1987), and in the writings of Chandra Mohanty (1988), Vandana Shiva (1987), and many African development activists. White points out the importance of Black women themselves designing and managing the

development policies and practices that can enable them to lead the way out of poverty and oppression.

Another issue apparently underaddressed in modernization and development discussions is the legacy of colonial history. There seems to be no conceptual space available in discussions of development, globalization, or transnationalism for this topic. It appears irrelevant and “oh so 1960s” to the considerations of development’s successes and failures. To be sure, we can now see evidence of the “uneven development of post-postcolonialism” around the globe.¹⁹ That is, in some contexts in the Global South, the postcolonial era has long been thoroughly engaged. In these contexts, what Europe did is no longer relevant to figuring out policy strategies for today. In other contexts—especially in the United States and Europe, for example—engaging with the history of colonialism and its unexamined residues is a task that for many theorists and policy makers still lies ahead.

Finally, development work tends to focus on the parts of the world that were colonized by Europe. Yet Eastern Europe is also in transition from its colonization by the Soviet Union. China is also rapidly developing within its own distinctive political, economic, and cultural frameworks as it moves away from its socialist economy era. These are two important areas that tend to be underanalyzed in discussions of women, gender, and development.

This chapter has been arguing that the failure to address women’s issues directly in development contexts not only damages women’s chances for flourishing and for equality; it also renders it impossible to achieve the eradication of poverty and advance of other, noneconomic kinds of flourishing that supposedly have been the goals of development projects for more than six decades. And it has demonstrated that recognizing the value of women’s different needs and desires—which are different for different groups of women—provides ways to improve the objectivity of mainstream development thinking. Maximization of objectivity and a full account of diversity can provide resources for each other.

We saw in chapter 2 that sciences and their societies co-produce and co-constitute each other. The next three chapters consider three additional contexts in which one can see that certain kinds of social values and interests can advance the objectivity of research, as well as democratic social goals.

4

Do Micronesian Navigators Practice Science?

No art or craft however primitive could have been invented or maintained, no organized form of hunting, fishing, tilling, or search for food could be carried out without the careful observation of natural process and a firm belief in its regularity, without the power of reasoning and without confidence in the power of reason; that is, without the rudiments of science.

(Malinowski 1925, 17; quoted by Nader 1996, 259)

No society could survive for any length of time without conducting a large part of their daily activities by the principle of belief according to the evidence. You cannot farm without some rationally based knowledge of soils and seeds and of meteorology; and no society can achieve any reasonable degree of harmony in human relations without a *basic* tendency to assess claims and allegations by the method of objective investigation. The truth, then, is that rational knowledge is not the preserve of the modern West . . .

(Wiredu 1979, 137)

In this chapter we turn to a different territory on which global disputes about objectivity claims play out.¹ Indigenous knowledge would seem to meet the basic requirements of the updated objectivity ideal presented in chapter 2. Mostly it produces reliable knowledge claims and is fair to the data it encounters and to critical perspectives on it—for example, by modern Western scientists and philosophers as well as by members of its own culture and of others. Yet educated Westerners only rarely regard it as satisfying the requirements of “real science.” That assessment hasn’t stopped Western sciences from appropriating

the observations of indigenous people about their environments, and some of their insights and methods, into modern Western sciences from 1492 (and earlier) to the present day.

Writing in what was still the heyday of European colonialism, Malinowski questioned the sharp line that peoples of European descent typically drew between the exceptionalist and triumphalist image they maintained toward their own attempts to understand nature and the backwardness and primitiveness they attributed to such attempts by the peoples they encountered in their far-flung colonies and empires.² Today, several decades of reevaluations of the sciences of non-Western peoples have added a great deal of detail to our knowledge about the empirical reliability, conceptual sophistication, and ingenuity of indigenous knowledge (Selin 2007; Watson-Verran and Turnbull 1995). Yet far too many educated Westerners still tend to assume that the differences between modern Western sciences and other cultures' indigenous knowledge systems are so great and so significant that it is not reasonable to consider the latter in the category of sciences. They disagree with Kwasi Wiredu's assertion that non-Western societies practice rational, objective investigation.

To be sure, the term "science" is not what indigenous cultures use to refer to their knowledge systems. Indeed, Galileo, Newton, and Boyle were "natural philosophers" to their contemporaries and to later generations. It was not until the early nineteenth century that the term "science" was introduced by William Whewell (John 2005, 188). So it might seem like one more piece of Eurocentric appropriation to refer to indigenous knowledge as sciences, as I will do here. Yet I do so for strategic reasons. I intend to level the epistemological playing field so that we can begin to understand the costs to us and to indigenous cultures of conceptualizing indigenous knowledge only as myth, magic, and superstition, or only as a residue of tradition that should be replaced by modern Western sciences' rationality and technological expertise. Of course there can be occasions when it is appropriate to focus on the distinctiveness of modern Western sciences: not all science is Science. However, when triumphalism is attached to the exceptionalism, it is impossible to avoid the Eurocentric contrast about which Malinowski and Wiredu have raised skeptical questions.

The contrast usually obscures much more than it illuminates, as we shall see. Moreover, it signals to others the enactment of a long-discredited colonial position, intended or not. This position is that the members of any supposedly primitive society only enter human history at the point when Westerners encounter them. Before that moment,

they are “people without history,” in Eric Wolf’s (1982) phrase. They are caught in the timeless unchanging patterns of life governed by myth, magic, and superstition. According to this view, it would be a great benefit to them if their knowledge seeking, social institutions, and everyday life were transformed by Western scientific rationality and technological expertise, as occurred in Europe. Modernization through development will raise their standards of living to those of the middle classes in the modern West. To be sure, this certainly could come to be the case for important aspects of their lives if the West’s development projects actually did reduce poverty around the globe. Sustainable supplies of safe food, water, and air and improvements in health and education could be beneficial to their flourishing—as to ours! But even if this did occur, should their indigenous knowledge systems be replaced, completely replaced, by modern Western sciences?

Ward Goodenough (1996) suggests that navigational systems such as those of Micronesians could be classified as practical sciences.

In calling this a practical science, I have in mind the kind of knowledge we have traditionally associated with engineering, knowledge that involves empirically tested principles and rules of thumb, organized into a coherent system of ideas, that works well in the achievement of practical objectives. Whether it is science, or craft, or art, or a mix of all three is a matter of how one chooses to fit it into Western intellectual categories about which we Western intellectuals are ourselves in some disagreement (42).

After all, historians and sociologists have shown, on the one hand, how engineering and other mission-directed sciences in fact regularly generate new knowledge. On the other hand, the purest of so-called pure science is always co-produced and co-constituted with its social order, and thus is never completely free of social and cultural fingerprints, as has been discussed in chapter 2 (Jasanoff 2004, 2005; Nowotny 2001; Shapin 2008). As has been argued in chapter 3, though indigenous sciences clearly are infused with cultural values and interests, this should not in itself disqualify them as producers of reliable knowledge. They exhibit valuable versions of objectivity.

This chapter identifies the benefits to indigenous peoples and to educated Westerners of regarding indigenous knowledge systems as full sciences, and thus leveling the epistemological playing field in illuminating ways. The next section identifies problems with the conventional

contrast between local and universal knowledge by examining two distinctive indigenous knowledge systems, those of the Micronesian Pacific island navigators and of the Canadian Cree goose hunters. Later sections look at the tangled histories of the West's relations to other knowledge systems, identify benefits of indigenous knowledge systems for indigenous peoples and for the rest of us, and note that there are at least five possible relations between indigenous knowledge systems and modern Western sciences, all of which exist now. There are good reasons to think that probably all five of these relations will and should continue to exist.

After the Divide between Local and Universal Knowledge

For centuries, Pacific islanders have successfully navigated great distances across the Pacific Ocean in huge open canoes, and they have safely returned home from their travels. The ability to return indicates that their navigational knowledge is not merely accidental or only local.³ They have constructed a cognitive map that enables them to move around as they wish within their world, and to deal effectively with both predictable and unpredictable local conditions. These navigators are “only” orally literate, as Westerners would say.⁴ They pass down from generation to generation the kinds of knowledge necessary to accomplish such feats. Especially useful are what we would call astronomy, climatology, oceanography, and cartography. Moreover, significant social, economic, and political knowledge and skills are necessary for successful navigation. Navigational knowledge “is not an isolated system but is an intimate part of ‘a network of social, economic, and other political ties’” (Gladwin 1970, 35; as quoted by Watson-Verran and Turnbull 1995, 124.). Nor is it merely practical, for “it adds a measure of meaning and value to every act, on land as well as at sea” (Gladwin 1970, 35). Such knowledge is embedded in a rich theoretical and observational system of locating one's position in the open ocean and continuing to travel in one's intended direction in the face of encountered obstacles that can drive one off course, such as winds, currents, and storms. This system is embedded in spiritual and social rituals, ceremonies, and the development and maintenance of the kinds of friendly relations among the navigators and other South Pacific islanders which are necessary to achieve successful travels. With ongoing successful social relations, they can expect to gain information and, in the event of trouble, aid from the other islanders, which they then provide to others in return.

Consider, for example, just one piece of this knowledge: how they establish “dead reckoning” (*etak*), which is keeping track of where they are as wind, tides, and other forces impact their intended path. This is done with the assistance of a star chart.

On a given voyage between islands, an island to one side of the seaway is chosen as a reference point. These reference islands are part of the sailing directions learned by the apprentice navigator for each island passage. Given that the rising and setting points of the stars are fixed points on the horizon, it is easier for the navigator to mentally represent the actual line of travel of his canoe by breaking it up into conceptual segments. The navigator does this by conceiving his canoe to be stationary and the reference island as moving backward against the backdrop of the rising and setting points of the stars. As the reference island moves from one such point to another, it completes a segment of the voyage (Watson-Verran and Turnbull 1995, 124–25).

On first reading, this description can set one’s head spinning. Yet it is not so dissimilar from how we might think of our relation to Albany, New York, as we travel from New York City to Boston. At the start of the trip, Albany would be due north. But when we arrive in Boston, Albany will have “traveled” such that it is now due west. That is, the way in which we use our mental or actual compasses is not so different from the Micronesian way of keeping track of the location of a canoe on the Pacific. For the Pacific navigators,

etak provides a framework “into which the navigator’s knowledge of rate, time, geography and astronomy can be integrated to provide a conveniently expressed and comprehended statement of distance travelled.” It is a tool “for bringing together raw information and converting it into the solution of an essential navigational question, ‘How far away is our destination?’” (Watson-Verran and Turnbull 1995, 125; quoting D. Lewis, 1975, 138).

Thus the Micronesians have created “a dynamic integrative conceptual framework. It enables the smooth meshing of the two conceptual devices, the star compass and Etak, so that the learned body of knowledge of star courses and sea-marks can instantaneously be summoned to the task of processing the observations of the moment” (125).

To turn to a second example, consider the knowledge of the Cree hunters of James Bay, Canada. They have developed hunting principles and practices that are successful at maintaining the supply of geese, which are a mainstay of their diet. This requires that they also maintain the necessary environments to attract the geese, as anthropologist Colin Scott reports (Scott 1996). These principles and practices are part of a model of hunting geese grounded in a particular metaphor. The metaphor is that of an egalitarian animal and human society in which the hunters and geese engage in respectful two-way communication. The geese give the hunters the gift of themselves only when the hunters demonstrate respect for the geese, as well as recognition both of the geese's distinctive environmental needs and of their fears. These practices are in turn integrated into a complex and strict set of social rituals regarding the environmental and social conditions under which the geese are to be killed and consumed. For example, they are to be killed only in assigned territories. Moreover, no excessive killing is allowed. Rituals also determine that the goose meat is to be fairly distributed within and among Cree families. At first, every man, woman, and child may receive a tiny bit. Once a sufficient supply has been produced, generous portions are distributed to all. From first to last these portions are distributed with no regard for who actually killed the geese.

Scott points out that like all societies, the Cree tend to project the social relations of their own culture onto the natural world and their relations with it. They are an egalitarian society, and so it is a model of egalitarian relations with the geese within which their hunting takes place.

Knowledge traditions reflect the morality of the social practices and paradigms in which knowledge is framed. Numerous studies have found that the "anthropomorphic" paradigms of egalitarian hunters and horticulturalists not only generate practical knowledge consistent with the insights of scientific ecology, but simultaneously cultivate an ethic of environmental responsibility that for Western societies has proven elusive (85).

Western societies also project their own different social order onto nature.

All societies, whether egalitarian or hierarchical, establish metaphorical connections between the social and the environmental. In all knowledge traditions, literal modeling defines and

redefines the relations among objects in the world, relations which in turn are assimilated to the meaning of root metaphors as they are applied in particular situations and contexts. Cree hunters are not less concerned than Western scientists with literal interpretation; nor are Western scientists less involved in figurative invention than Cree hunters. The conventional social context of Western science tends to hierarchy and centralized control, however, and this is the morality that is metaphorically projected onto our own relations with “nature.” For this very reason, the historical disqualification and subjugation of indigenous knowledge is intimately linked to Western culture’s domination of nature (85).

Do these hunters practice science? Here is Scott’s reply.

The answer to this question would seem to depend on whether one defines science according to universal features, or culturally specific ones. If one means by science a social activity that draws deductive inferences from first premises, that these inferences are deliberately and systematically verified in relation to experience, and that models of the world are reflexively adjusted to conform to observed regularities in the course of events, then, yes, Cree hunters practice science—as surely all human societies do. At the same time, the paradigms and social contexts of Cree science differ markedly from those of Western science—accustomed as we are in the West to a “root metaphor” of impersonal causal forces that opposes “nature” to “mind,” “spirit,” and “culture,” and conditioned as we also are to view legitimate scientific procedure and production as the prerogative of particular professional and institutional elites (69).

Scott’s answer provides yet another example of observations about how societies and their sciences co-produce and co-constitute each other in a variety of ways, as was discussed in chapter 2.

Scott and Goodenough are just two of the many Western researchers and scholars who recently have been vigorously pursuing Malinowski and Wiredu’s insight that every society must have the basic skills and interests of scientific research in order simply to survive, and that every knowledge system contains myth, magic, superstition, and social metaphors for what we refer to as the natural order—which, as an object of knowledge, is also social. There are many hundreds, perhaps even

thousands, of other examples of effective indigenous knowledge which have been reexamined in recent decades (Selin 2007). Some are familiar in the West, such as Big Pharma's extraction of indigenous pharmacologies from the disappearing societies of the Amazon rain forest or tropical Africa, and the histories of economic botany often carefully labeled on nature walks at historic colonial sites (Harris 2005; Schiebinger 2005a, 2005b). Additionally, there are the many Asian health therapies that are widely practiced in the West (Goonatilake 1998).

What have been the relations between modern Western sciences and other cultures' knowledge systems in the past?

Tangled Histories

Modern Western sciences have had long and complex histories of relations with the knowledge systems of other cultures. Europeans have appropriated scientific knowledge from other cultures virtually whenever they have encountered the latter, and certainly throughout the long eras of European and US colonialism and imperialism⁵ (Harris 1998; Nandy 1983; Sachs 1992; Schiebinger 2005). Some historians argue that the appropriation of what became significant elements of economic, political, social, scientific, and technological assumptions and practices, especially from Asia, has been much more extensive than Westerners have acknowledged. From this perspective we could reasonably think about "the Oriental West" (Hobson 2004; see also Blaut 1993). This kind of account contrasts with the standard Western origins story about the legacies from ancient Greece, the European Renaissance, the scientific revolution, and the Enlightenment that frame conventional Western political, science, economic, and social histories (Blaut 1993; Hobson 2004). It is not that the standard account is completely wrong, but that it occludes powerful influences on modern Western sciences that came from other cultures around the globe. Westerners continue today to regard indigenous knowledge as not real science—as we learn, for example, from media reports of the legal struggles over what intellectual property rights indigenous knowers can draw on against the pharmaceutical companies that plunder their plant materials and their knowledge of how to use them (Brush 1996; Foster 2012).

To be sure, learning ideas, technologies, and just about everything else imaginable from other cultures, as well as from other individuals and disciplines in our own culture, is a good part of what "advancing the growth of knowledge" is about. You are reading this book to appropriate whatever you find useful for your own current thinking, research,

and teaching projects, among other reasons, and my citations reveal sources of and stimulants to my own thought. Learning is always a social process (an issue to be pursued further in chapter 7). So, too, have indigenous knowers appropriated elements of modern Western sciences for their own practices. Yet the dissemination of scientific theories, observations, and methods has conventionally been characterized by Westerners as a one-way trip from the West to the rest. Yet it has always been a two-way process. Consequently, the world today contains little else but hybrid knowledge systems. It is probably impossible to find anywhere on earth the static, “authentic” culture, untouched by environmental change or by interactions with other cultures, that exemplifies the typical image that comes to mind for most educated Westerners when they hear the term “indigenous knowledge.” This is just one reason why the very contrast between modern Western sciences and the indigenous knowledge upon which the “myth, magic, and superstition” stance rests is so suspect (Agarwal 1995; Gupta 1998; Prakash 1999).⁶

So the point here is not to criticize the practice of learning or appropriating from other knowledge systems, but rather to criticize other intellectually, ethically, and politically unattractive aspects of this practice in the history and present practices of the West. One such practice is the often exploitative way in which the West has appropriated ideas and practices from others. This has all too often occurred through colonial or imperial violence, including the intentional destruction of the societies and environments upon which such indigenous knowledge systems depend (Rodney 1982; Sachs 1992). Another is the failure to acknowledge modern Western sciences’ role in such exploitation. It is one problem to do wrong and a second to fail to admit it (as crisis management consultants often tell their corporate clients). Yet another problem is the failure to acknowledge the important contributions of many other cultures to the successes of modern Western sciences, and more generally to the storehouse of human knowledge achievements—whether these contributions be voluntary or involuntary on the part of other cultures. Finally, there is the reliance on conventional epistemological and ontological contrasts which persistently situate our own accomplishments in Eurocentric and colonialist exceptionalist and triumphalist positions, and everyone else’s endeavors in an entirely different and inferior category. According to this account, we alone have produced the magnificent achievements of modern sciences, while other cultures have remained captives of traditional myth, magic, and superstition (Nandy 1983; Schiebinger 2004a, b; Sardar 1988). Thus the intellectual

and moral energies of Western scientists, their institutions, and the general public are continually renewed through reminders of our superiority over indigenous knowledge and the peoples who produce it, as the latter are encountered around the globe, in our midst, and in the past of the West.

Prevailing philosophies of science claim that modern sciences have left behind such culturally local and anthropomorphic beliefs and practices originating in our own traditions. But critics point out how they have not. Historians and ethnographers have thoroughly documented the extensive myth, magic, religion, and anthropomorphism that can be found in modern Western sciences from their origins through the present day (Jacob 1988; Nader 1996; Noble 1995; Yates 1969). Modern Western sciences are co-constituted with their social orders, we can now understand (Jasanoff 2004; Shapin and Schaffer 1985). Consequently, maps for distinctive kinds of supposedly natural social relations are always embedded in these sciences, too, as the social relations in turn are permeated by assumptions and practices that advance and validate modern Western sciences and the nature they report, while invalidating indigenous knowledge systems. Modern Western sciences are fully inside their societies, and those societies are fully inside those sciences (Chakrabarty 2000). Worse yet for the conventional contrast between these sciences and indigenous knowledge systems, it turns out that these cultural legacies, including, for example, specifically Christian and even Protestant commitments in the West, are often *productive* of the advance of scientific knowledge. These cultural legacies characterize the very best of modern Western sciences, not just the worst, as Thomas S. Kuhn (1970) famously began to grasp half a century ago. Thus, the intellectual and moral energy on which the identity and self-evaluation of modern Western sciences and their societies depend is grounded in a contrast that is spurious in several respects.⁷

Physics, chemistry, genetics, and the other modern Western sciences are without doubt the most powerful knowledge systems around the globe today, at least in the natural and social contexts for which they were designed or in which they have been valued. The conventional Western account of their achievements focuses on how they have advanced through the genius and hard work of scientists: the preoccupation with testing hypotheses against the material facts, and with standardizing their practices and languages in ways that permit them more easily to be used by peoples from different cultures. Of course this is all absolutely true. Nothing I have said or will say contests these claims. There

are good reasons why peoples around the globe, not just in the West, want access to so many of the research processes and products advanced so successfully by modern Western sciences.

The issue here is rather that this is only part of the history of modern Western sciences. There are often unrecognized problems lurking beneath this rosy picture of success, as I have already indicated. To what extent did Western expansion through imperialism and colonialism make valuable contributions to the advance of Western sciences? How did it also result in tragic destruction of competitive indigenous knowledge systems, in the course of which those sciences provided provisions for Western expansion (Hobson 2004)? To what extent does a continuing hostility to Islam over many centuries mask the extensive groundings of modern Western sciences in ancient Islamic and Arabic achievements? Such questions engender larger ones. Must the projects of modern Western sciences remain mostly directed toward nationalist, military, and profiteering goals, even against the intentions of the scientists involved? How much responsibility for environmental destruction and increasing social inequality should be laid at the door of the institutions, practices, and ethics of these sciences? What would it require to redirect modern Western sciences effectively toward the goals of local and global multicultural, democratic societies?

Before proceeding further, let us clarify just what will be meant here by indigenous knowledge. The term has been used to refer to five different kinds of knowledge that supposedly contrast with what the West intends by the term “scientific knowledge.” One is knowledge about what the West would refer to as the natural world, which is self-produced and managed by an indigenous culture in ways that respond to *its* needs and desires. Thus, this kind of knowledge will include cultural elements such as anthropomorphism, perhaps religious and spiritual elements, and sometimes distinctive ceremonies and rituals. This is how I will use the term. Yet other writers use it in other ways. Often the term is used to refer only to the environmental, physical, or material part of this knowledge, excising those culturally local elements that cannot be translated into modern Western scientific terms. In another usage, the term is used to refer to any premodern understandings and claims about humans and their environments, in the West as well as elsewhere. In this usage it includes popular European knowledge before the West’s scientific revolution and before any particular scientific theory, such as Darwinian evolution (e.g., Marks 2007). Sometimes the term is used to refer to any knowledge held by non-Western peoples, including those of such early highly developed societies as India, China,

Arabia, and Islam, as well as complex amalgamations and hybrids of self-produced and borrowed elements. Finally, the term is sometimes used to refer to everyday knowledge in the modern West—to “folk knowledge.”⁸

We can note also that the term “indigenous” is itself controversial in ways beyond those already suggested. Just who is indigenous and who is not? Some demographers would answer that only a few Africans are indigenous, since, according to one theory, everyone else’s ancestors have emigrated from a few sites in Africa to other places in Africa and on to the rest of the globe. But even without such a severe standard of authenticity, there are plenty of opportunities for dispute. Human societies have always had encounters with each other. They have often traded women and children along with beads, shells, scientific insights, and technologies. So the boundaries of any particular lineage have probably been fairly fluid over hundreds and even thousands of generations. We should also recognize that, these days, new forms of indigenous knowledge are being produced by indigenous peoples who have developed the distinctive skills to function effectively both as members of their indigenous groups and as vigorous participants in local, national, and international negotiations with people not from their own groups. Disputes about indigeneity will probably be with us for as long as resources are distributed or withheld on its basis.

It is time to turn to consider the benefits that flow from recognizing the importance of indigenous knowledge.

How Do Indigenous Peoples Benefit from Their Knowledge Systems?

Modernization theories have held that as Western scientific rationality and technical expertise have disseminated around the globe through so-called development projects, they will replace the myth, magic, and superstition that have played such a big role in maintaining the supposedly backward and primitive non-Western societies and their inferior knowledge systems.⁹ Yet science and technology intellectuals from those societies and from the West argue not only that this scenario fails to understand the value of indigenous knowledge to those societies, but also that it cannot recognize their great value to the modern West. Moreover, it is not that Third World science and technology policy makers and intellectuals do not want access to greater scientific rationality and technical expertise. Rather, they want it on their own terms, which requires also preserving and developing significant aspects of their local knowledge systems. We return later in this chapter to consider how these two

goals might be achieved simultaneously. Here are some of the benefits to indigenous peoples that this literature identifies.

Empirically Reliable and Predictive Contrary to Eurocentric assumptions, such knowledge systems have been continually tested and adapted to changing natural and social environments, often for centuries and even millennia. They have enabled those cultures to interact effectively with their environments throughout their long histories. Thus, these sciences tend to be empirically reliable and predictive in the relevant natural and social environments, as the examples reported above indicate (Appleton et al. 1995; Goodenough 1996; Scott 1996; Selin 2006). While these achievements have often been politically “defeated” by the immense power of Western expansion, many of them have not been disproved, as philosopher James Maffie (2009) has pointed out about non-Western technologies. These knowledge systems, too, are part of the valuable legacy of human achievement. Of course this is not to say that indigenous knowledge systems have no serious limitations; every human knowledge system has them. Sometimes such limitations may lead to nasty, short, and brutish lives. Yet this is the case also for so many people living in modern societies today. Consider, for example, those who are subjected to warfare; who live in toxic environments or in alcohol, smoking, or drug cultures; or who are poor and suffer from the above maladies as well as from malnutrition and lack of access to health care.

Preserving Local Environments Moreover, this knowledge is what has both motivated and enabled indigenous peoples to preserve the environments on which they depend for food, shelter, health remedies, and other necessities of daily life (as the example of the Cree hunters indicates). When they lose this knowledge—for example, through loss of land rights to international agribusiness, or to oil companies, by migration, or through recruitment into only modern Western scientific knowledge—those environments tend to deteriorate or even be intentionally destroyed. Moreover, loss of human languages also results in loss of environmental knowledge. Human languages are disappearing every year, along with the cultures of their speakers. Sustaining global biodiversity turns out to depend at least to some extent on the sustaining of cultures and their languages. Parts of nature “not talked about” tend to be seen as wastelands or “only weeds.” Thus the loss of languages, cultures, and sustainable environments seems to be causally linked (Maffi 2001; Muhlhausler 2001; Nader 1996; Shiva 1989).

Here we can begin to see what a tragedy it would be if there came to be only one global knowledge system—a “theory of everything!” Yet even the engineer and historian of science Susantha Goonatilake, who is one of the most astute critics of the West’s exceptionalist and triumphalist attitudes toward its own sciences, seems not to appreciate fully this tragic aspect of the attempts to achieve a unified global knowledge system. A robust appreciation of the power of modern Western sciences leads him to assume that other cultures’ knowledge systems must be linked into modern Western sciences if the former are to survive at all. They must “fill in” the “empty spaces” in modern Western sciences’ picture of the world (Goonatilake 1998). He surely is right that the West can expand its knowledge by incorporating observations and insights from other cultures, and that it is impossible or at least foolhardy to try to develop useful sciences with no connections to existing scientific knowledge. Moreover, the image of filling in the tree of knowledge is a compelling one. Yet it assumes an actual or desirable coherence between the world’s knowledge systems which has recently become unsupportable as either fact or desirable goal, as chapter 5 will explore. Furthermore, it does not follow that non-Western sciences will or should be completely extinguished, leaving just one totalizing science in existence that contains traces from other knowledge traditions.

The Only Science Available There still are many societies around the globe that do not have access to Western medicine, pharmacology, food production, or manufacturing. These often are the most remote societies, or those of the poorest of the poor. Such cultures exist also in industrialized nations, in both rural and urban environments. Their physical survival today often depends upon being able to take care of their own needs for food, housing, clothing, travel, health, medical, and pharmacological practices, and to protect themselves from often dangerous and increasingly impoverished urban and rural environments. Few of the more privileged of the globe’s inhabitants could survive for very long in remote rural areas, in dense jungles or forests, on deserts, in extreme temperatures, or in the metropolitan slums that exist around the globe without the distinctive kinds of knowledge developed by those who do manage to live in such environments. It would be a tragedy for many millions of people if such knowledge disappeared.

Repository for Cultural Values, Incubator for Creativity Next, these knowledge systems, too, are co-constituted with the cultures’ social relations and intellectual and ethical legacies, including spiritual and religious

legacies—just as are Western ones, as the field of science studies has documented. They are deeply intertwined with the ways cultures are organized and structured, and with their members' cultural identities, as we saw with the examples of the Micronesian navigators and the Cree hunters. It is not just that cultures influence already preexisting sciences, or that sciences shape preexisting cultures, though some elements of these phenomena do occur. Rather, social formations and scientific institutions and practices come into mutually supportive existence together, both in our own Western societies and in others around the globe, as we saw in chapter 2 (Hess 1995; Jasanoff 2004, 2005; Shapin and Schaffer 1985). Indeed, even historical forms of such regulative ideals as objectivity are co-constituted with historically specific kinds of ethical social identities (Daston and Galison 2007), as are strategies for maximizing objectivity (Jasanoff 2004, 2005). Thus, indigenous knowledge systems are a central part of these cultures' sense of themselves, who they are, and what they value in life.

They are also a source of distinctive kinds of creativity. As one group of Third World intellectuals has put the point:

Evolving indigenous scientific culture requires Third World scientists, technologists, decision makers and activists to appreciate the true value of traditional science and technologies. Traditional technologies and medical systems should be upgraded, developed and promoted. They should form the basis for the evolution of indigenous, but thoroughly contemporary, alternative technologies and health care systems. . . . Only when science and technology evolves from the ethos and cultural milieu of Third World societies will it become meaningful for our needs and requirements, and express our true creativity and genius. Third World science and technology can only evolve through a reliance on indigenous categories, idioms, and relations in all spheres of thought and action (Third World Network, 1993, 487).

Thus, the creativity of sciences and technologies emerges from deep historical legacies of cultural tradition and identity. To sense the psychological and social stress that can come from being asked to give up such a part of one's sense of self, culture, and legacy from one's ancestors, think of the deeply felt emotional and intellectual dislocation so many Westerners have expressed at the thought of separating ourselves, even in relatively minimal ways, from the Enlightenment and its models of

ideal knowledge—for example, in the “science wars” of the 1990s.¹⁰ These culturally embedded indigenous knowledge systems are a rich resource for the advance of human knowledge. It is precisely their roots in distinctive cultural legacies that enable them to come up with continually innovative and valuable responses to changing social and natural environments.

A Political Resource Finally, other cultures’ defenses of their own knowledge systems are a valuable political resource for their struggles to protect their cultures from destruction by continued Western economic, political, and cultural expansion (Escobar 1995; Hayden 2005; Sachs 1992; Sardar 1997; Scott 1996). To insist on the value of one’s traditional knowledge system is to refuse to be completely assimilated into another’s world.

Moreover, when Westerners assign other cultures’ knowledge systems to the “uninteresting” premodern world, we thereby turn these groups into “peoples without history,” as we noted Eric Wolf famously put the point about European historians’ standard treatment of peasants (Wolf 1984). Such a practice assumes that a society only begins to have a history when modern Europeans first encounter it. Many well-intentioned and otherwise progressive accounts of science and technology around the globe today tend to dismiss attempts to reevaluate these legacies as mere nativism or identity politics. They prefer to focus on the sciences and technologies of globalization or transnationalism. In such models, the histories of colonialism and imperialism appear irrelevant to the histories of both traditional non-Western scientific and technology legacies, and to the history of Western sciences and technologies. Indeed, the notions of globalization and transnationalism can be used in ways that leave no conceptual space for thinking about colonialism, imperialism, and postcolonialism. Such topics can seem beyond the horizon of discussions of globalization or transnationalism. Of course there are contexts in which globalization and transnationalism frameworks are useful. Yet one can legitimately wonder to what extent preoccupation with them provides a convenient way to avoid thinking about the legacies, residues, and reinventions of forms of colonialism and imperialism that inflict harm on people in other cultures. It cannot be desirable to advance the ignorance of Westerners’ thinking about facts of global political economies, or to leave no room for pondering the relevance to our understandings of science and technology of the collective experiences of those who have suffered from Western colonialism and imperialism.

In contrast, the new histories and ethnographies of non-Western knowledge systems begin to reveal the diverse strategies other cultures have developed for adapting to and flourishing in worlds otherwise obscured in Western histories of science. And such studies can begin to reveal previously obscured histories of the West, as indicated by Hobson's (2004) documentation of "the oriental West," mentioned above. J. M. Blaut (1993) identifies many conceptual practices that enable Europeans to find it appropriate to ignore other cultures' roles in the creation of the modern Western world. One, for example, is the "tunnel of time," by which we modern Westerners reclaim classical Greek achievements for ourselves alone, ignoring the long and fruitful history of the Greek legacy in Arabic and other non-Western cultures, and how these cultures also contributed to the advancement of the West.

These reasons for appreciating the value of indigenous knowledge should be sufficient to motivate ending their destruction and devaluation by educated Westerners. Yet it is not just indigenous societies that benefit from sustainable indigenous knowledge systems. The flourishing of these knowledge systems also can provide significant benefits for Westerners.

Benefits for the West

New Knowledge For one thing, we in the West can learn new facts about nature and social relations from other cultures' knowledge systems. After all, Westerners always have done so. Other cultures have asked different questions about different environments, drawn on distinctive local discursive traditions, and used methods unfamiliar or devalued in the West. Commercial enterprises, from colonial economic botany through today's Big Pharma, have always understood how valuable these other knowledge systems are. They have actively sought to turn native informants' knowledge into the kind of culturally anonymous information that Western corporations can use, buy, and sell around the globe, as indicated earlier (Schiebinger 2004). Moreover, an especially important research issue here is to understand better the complex relations between cultural, linguistic, and biological diversity.

New work in this area raises many questions. Is it only the indigenous societies that should be assigned the responsibility for reversing such losses? If not, what are appropriate roles for Western societies in such a project? And how should indigenous knowledge be preserved and nourished? Gene and data banks take the aspects of interest to Westerners out of the cultural contexts that produced and gave them meaning,

thereby eliminating their indigenous character and often putting them out of reach of indigenous peoples. Yet the indigenous societies themselves are rapidly disappearing, along with their knowledge.¹¹

Exploring Unfamiliar Logics Another important benefit is that learning about other cultures' knowledge systems invites Westerners to engage with unfamiliar logics of nature's order and of research. As the discussion of the Pacific island navigators and the Cree goose hunters reveals, one can practice giving up the universal value of some of the great binaries of modern Western thought, such as facts versus values; secularism versus religious myth, magic, and superstition; anthropomorphism versus "dead matter in motion"; "knowing that" versus "knowing how"; the unity versus the multiplicity of sciences; and the like, to be examined further in later chapters (Viveiros de Castro 1996). Instead, we can reevaluate in which contexts these remain useful and in which they create unnecessary obstacles to our goal of advancing sciences for multi-cultural, democratic societies. We can begin to recognize the roles these binaries play in, for example, the difficulty of fully adopting an environmental ethic, as Scott pointed out above.

Moreover, grasping such unfamiliar logics reveals the sophisticated abstractions and theoretical frameworks that are invented in those supposedly primitive societies. Usually the "root metaphors" of our own sciences become implicit and invisible to us, while we have little trouble spotting other cultures' distinctive metaphors, models, and analogies (Scott 1996; cf. Hesse 1966). It can come as a shock to discover that our own claims, which we have taken to be completely factual, remain part of powerful suppressed metaphors and models of our own—ones we thought we had left behind. One can easily think of a number of these, such as the metaphor of nature as a machine, of our planet as the center of the universe ("The sun rose this morning at 7:32"), the earth as a great living body ("Geologists have found a new vein of ore"), and of science as a search for religious or moral salvation. Thus, coming to see the world around us through others' interests, values, discursive legacies, and practices suggests that it can be reasonable to think in terms of a world of multiple effective scientific rationalities (Prakash 1999). We are lucky to live in a world of continually evolving scientific traditions—a "world of sciences."

Ethics and Politics of Research There are ethical and political reasons for Westerners to think further about and value the continued existence of these knowledge systems. What does it mean for Westerners to refuse

to acknowledge the pre-encounter histories of other cultures, their successful strategies for surviving difficult conditions, and the legitimacy of their moral and intellectual legacies? What does it mean when in the past and today we find it appropriate to plunder these legacies and leave them in ruins in order to achieve our own projects? Shouldn't we be scrutinizing the ethics and politics of extracting information from already politically and economically weakened cultures? It cannot be desirable for Westerners to fail to grasp the astonishing diversity of fruitful human interactions with social and natural environments. But what is the best way to organize such projects today? We will return to such issues in later chapters.

New Perspectives on Limitations of Modern Western Sciences Gaining a more reliable understanding of others enables us better to grasp both the strengths and limitations of our own sciences and their philosophies. Our epistemologies are regarded as “underdeveloped” by Third World science and technology intellectuals (Nandy 1990; Third World Network 1993). It turns out that it is we who in significant respects are the intellectually, politically, and ethically underdeveloped societies, incapable of grasping our own locations in world history. Our philosophies of science seem to lack sufficient resources to gain a realistic grasp of the strengths and limitations of our own and others' knowledge systems when they are faced with the intellectual and ethical challenges presented by effective and powerful knowledge systems of other cultures. To put the point another way, this kind of argument directs attention to the necessity of strengthening the regulative ideals to which the modern Western philosophy of science legacy is so committed. These ideals are not modern enough, one could say, for they are still trapped in myths about their own status that do not take sufficient account of the critical perspectives available from other cultures. They need “epistemic modernization,” as we saw David Hess (2007) put the point in chapter 1. The argument here has been that through recognizing the distinctive strengths and limitations of other cultures' knowledge systems, one can strengthen the objectivity, rationality, and good methods of modernity's own knowledge systems. We need more objectivity than we have had the resources to achieve.

Let me remind readers that the argument here is not that indigenous peoples should have access only to their indigenous knowledge systems, leaving modern Western sciences firmly in Western hands. Many non-Westerners participate in the production of modern Western sciences in their own labs at home and in the West; many do not particularly value

indigenous knowledge systems and do highly value modern Western sciences. The argument here is, rather, that Westerners misunderstand both their own sciences and those of other cultures when they persist in the exceptionalist and triumphalist assumptions that nature's order is singular, that only the modern West can detect it, and thus that only the modern West has been able to develop reliable and useful knowledge of nature's order and social relations, and is capable of doing so in the future.

Thus we can see that indigenous knowledge systems are valuable to those who have maintained them, and also to we who for the most part are sympathetically encountering them only now. The strategy of "leveling the playing field" by considering these systems, too, as sciences has enabled us to get issues in focus that are otherwise obscured.

Future Relations between Indigenous Knowledge Systems and Modern Western Sciences

Finally, what should be the relations between modern Western sciences and indigenous knowledge traditions within the ethics and politics of advancing multicultural democratic societies?¹² This question frequently arises for Westerners when they first encounter arguments such as those presented here. My students ask, "How can we tell who is right and who is wrong?" Here we see the demon of cognitive relativism trying to take over the conversation. Before directly addressing the issue of how to block its entrance, it will be worthwhile to identify five kinds of relations between modern Western sciences and indigenous knowledge systems that currently exist and which, it is to be hoped, will continue to be developed.

Integrate Theirs into Ours Indigenous cultures are themselves rapidly disappearing, and with them all too often goes their share of the legacy of human scientific and technical knowledge. This fact is what stimulated Susantha Goonatilake (1998) to argue that it is crucial to global human flourishing to gather into modern Western sciences these legacies of environmental, medical, and other kinds of knowledge. We should try to integrate them into our sciences as best can be done. One cannot just go out and develop a feminist science or an Islamic science to replace modern Western science, he argues, with respect to such existing proposals (e.g., Harding 1986; Sardar 1997). Modern Western science has already constructed such a powerful and extensive system of thinking and practice that competing sciences are doomed to marginal status or

even extinction if they do not “join it,” Goonatilake argues. If we want to preserve the achievements of these other knowledge systems, they must be integrated into modern Western science.

This can seem a compelling argument. Yet we can note, as Goonatilake does, that only a limited part of such indigenous knowledge systems can be appropriated, translated, or smoothly “sutured” into modern Western science, since the conflicting epistemological, ontological, and methodological aspects of the appropriated sciences will not fit into the modern Western science conceptual framework. Much of the cultural specificity that nourished and made meaningful the original production of such knowledge must be lost in such processes. Moreover, as Goonatilake is also aware, this strategy is precisely characteristic of the colonial and imperial history of modern Western sciences. Yet isn’t it possible that the economic, political, social, and intellectual imperatives of the West can themselves shift to settle into an egalitarian global social order? In some research areas, today’s modern Western sciences might remain dominant; in other areas other sciences might prove more desirable. Even if this turns out not to be possible, do we know this today and, therefore, should we give up trying to create the kind of egalitarian social order that could permit such flourishing of “a world of sciences” and their cultures? Goonatilake seems to assume that knowledge systems are coherent wholes, though other observers propose instead that they can be disunified, plural, or multiple even within one field such as biology, and can be assemblages or collections of elements even within one of these subfields. They can be functionally effective without being completely coherent (Watson-Verran and Turnbull 1995; Gupta 1998). As we will return to consider in chapter 5, modern Western sciences are already plural in such a way that it is possible to envision them as co-existing among a multiplicity of sciences that do and can flourish in the local global societies of today and tomorrow (Dupre 1993; Galison and Stump 1996; Kellert, Longino, and Waters 2006).

All this said, we should not want to lose Goonatilake’s fundamental appreciation for the high value of other cultures’ knowledge systems, and for their value to us, who live primarily in the world of modern Western sciences.

Delink A second strategy is for non-Western societies to try to delink from Western ones. In response to the conventional image of modern Western science that Goonatilake assumes, critics have argued for other societies simply to withdraw from the modern West. The hegemony of Western culture is so extensive and powerful that other cultures’ needs

and creative energies cannot be nourished in the presence of such powerful counterforces (Amin 1990; Third World Network 1988; Nandy 1990). As the Third World Network was quoted earlier: “Only when science and technology evolve from the ethos and cultural milieu of Third World societies will it become meaningful for our needs and requirements, and express our true creativity and genius.”

Of course, it is not possible for societies to delink from each other completely in our networked social and natural worlds, as these critics well understand. Ozone holes; climate change; acid rain; nuclear leaks; pandemics; plant, animal, and human migrations; the armaments trade; sex work; drug networks; terrorism; and other such phenomena do not respect national or any other attempted social boundaries. Coordination and cooperation are crucial in every society to avoid the bad effects of such phenomena. Nevertheless, a certain amount of delinking that enabled non-Western forms of creativity better to flourish certainly could be desirable (Sachs 1992). Moreover, just contemplating the withdrawal of many non-Western societies from economic, political, and scientific and technological interactions with the West can sharpen our focus on just who is dependent on whom and for what. For example, who would staff our science labs or service industries or provide cheap agricultural, construction, and manufacturing labor or products if the Third World did delink from the West? Who would supply all the raw materials mined in Third World countries that the West needs for its manufacturing and for the construction of the instruments necessary for the advance of its own sciences and technologies? In fact, in important ways it is the West that depends upon the rest of the world, including especially on the labor and land rights of women and peasants, as German sociologist Maria Mies (1986) explained so vividly years ago (and as was argued in chapter 3 of this book). Already, resisting the West’s “free trade” agreements is one of many ways in which politically and economically vulnerable countries try to delink from the powerful Western political economy. Another range of such attempts is visible in UNESCO’s and even some nation-states’ support of linguistic subcultures within national or regional boundaries.

Integrate Modern Western Sciences into Other Knowledge Systems A third relation is for elements of modern Western sciences to be integrated into other cultures’ sciences and technologies. This has always occurred as other societies carefully “sutured” what they wanted (or were forced to take) of modern Western sciences into their own material environments and their own ethical, cultural, and political legacies (Eisenstadt 2000;

Gupta 1998; Murata 2003; Prakash 1999). This is a practice that produces “a world of sciences” that overlap in many ways, yet which leave each with its own distinctive cultural commitments and local expertise.

Collaborations Scientists in many fields today increasingly collaborate on scientific projects with indigenous knowers. Whether no longer willing or no longer permitted to engage in the intellectual piracy of the past, archaeologists, agriculturalists, medical and health scientists, and environmentalists, to mention just a few obvious examples, have actively developed jointly designed and managed projects. They use the very best resources of both modern Western sciences and indigenous knowledge systems (Bass 1990; Colwell-Chanthaphonh and Ferguson 2008; Fortmann 2008; Gupta 1998; Nader 1996). To be sure, this undoubtedly is less the case in the most abstract research fields such as physics, chemistry, and mathematics. But this provides no reason to ignore the benefits of such successful collaborations in other fields.

They Provide Models for Us We could take a different perspective on the first proposal, and try to transform modern Western sciences through precisely the ontological and epistemological “borrowings” that most conflict with those of modern Western sciences, not just with the elements that can be perfectly slipped into the conceptual framework of modern Western sciences. As we will see in chapter 6, other cultures do manage to achieve empirical reliability when many aspects of their scientific and technological practices are suffused with local cultural values and interests, including spiritual and religious ones. We can recognize that modern Western sciences, too, have produced empirically reliable results of research within frameworks from Western religious traditions (e.g., Canizares-Esguerra 2005; Harrison 2005; Harris 2005; Marks 2007; Needham 1969; Noble 1992, 1995).

To take another example, many non-Western cultures have learned to live with both their own indigenous knowledge systems and with modern Western sciences, even when there are deep conflicts between them. The educated classes in India during the two-century British occupation learned to use British pharmacologies and health practices as well as their own ayurvedic ones, making “indigenous” decisions about the circumstances in which each was relevant.¹³ How different are such situations from those of the many US citizens who rely both on modern Western medicine and on acupuncture or chiropractic (even before they have qualified for third party payment!), Asian exercise regimes, and the many “grandma’s remedies” they learned in childhood?¹⁴

Which one of these relations between indigenous and modern Western scientific knowledge will prevail? My view is that we should not rank these, choosing only one or several over the others. Rather, all of these (and perhaps others) are already in play, and they will undoubtedly all continue to flourish in various contexts. Instead, we can ponder their strengths and limitations in light of their theoretical and practical uses in particular social contexts, both intellectually and from ethical and political perspectives.

The demon of relativism doesn't get to take over such conversations if we keep in focus the fact that these diverse knowledge systems are practically useful for particular, always local, social projects. How to deal with chronic pain? Which agricultural practices work best for *this* particular local environment? It is the practical aspect of the way people select which knowledge strategy on which to rely that insures that relativist issues can't arise. It is only if we neglect the importance of the success of interventions in nature, and become preoccupied with representations of nature, as philosopher Ian Hacking (1983) famously put the point, that the relativism demon gets to monopolize the conversation. Chapter 5 returns to such issues.

About such issues, we can ask which social and cultural values and interests we should use to direct scientific and technological projects, and how our scientific and technological work should contribute to progress toward ethical and political goals. That is, we can turn the descriptive co-constitutive relations of sciences and their societies into projects for progressive social agency, rather than only for empirical reporting. This is what the standpoint- methodology-enabled feminist and other anti-authoritarian social movements do.

Who Gets to Decide?

Who gets to settle these many issues raised by the possibility of positive reevaluations of the strengths of indigenous knowledge systems? Such issues are going to be with us long into the twenty-first century as we in the West try to figure out just how and how not to leave behind the Eurocentric, androcentric, and positivist tendencies that so powerfully shaped the last century's scientific and technology research. It is clear that the West will not get to settle this issue for other cultures, in spite of the efforts of Western nation-states and corporations to secure primarily for themselves the benefits they find in other lands. These efforts are still perceived by many as the continuation of colonial and imperial practices of intellectual and material piracy. In order to make ourselves fit to

function effectively in the pluri-centered intercultural economic, political, social, science, and technology social relations that we can help to bring about, we need to develop intellectual, political, and social skills different from those that have been valued in the eras of Western colonialism and imperialism.

5

Pluralism, Multiplicity, and the Disunity of Sciences

Chapter 3 argued that feminists ask different questions about nature and social relations, use different methodologies (such as starting research from women's daily lives), and arrive at results of research that conflict with dominant Western ones—for example, on the topic of women, gender, and Third World development assumptions, policies, and practices. Chapter 4 argued that the world is full of sciences. For example, Micronesian navigators and Cree goose hunters create and practice the distinctive kinds of systematic investigation of their environments that their societies need in order to flourish. But so, too, do the peoples of every other society around the globe—in the Arctic, the Amazon, Los Alamos, Silicon Valley, Cape Town, Teheran, New Delhi, and Tokyo. Chapter 4 identified reasons also for Western societies to value non-Western sciences: both for what they tell us about unfamiliar environments and for what they tell us about nonstandard investigatory practices. Likewise, they should be valued for what we can learn from their perspectives on our own sciences. A “world of sciences” turns out to provide benefits to everyone.¹

Yet this insight, that the world's sciences are multiple, raises a number of questions for those of us who were taught that there is one and only one real science, namely modern Western science. How can we tell who is right

when different cultures' knowledge claims conflict? And in these cases, is it just the claims themselves that conflict, or are different standards for objectivity, rationality, good method, empirical reliability, and even what constitutes reality also at issue? Could it be that Western standards for good science are just one of the many reasonable and desirable possible sets of such standards?

This chapter looks at how arguments surprisingly similar to those in chapter 4 have begun to arise from within mainstream contemporary philosophy of science in the United States. A number of philosophers and historians have begun to explore how modern Western sciences—biology, quantum physics, and even mathematics—are today clearly disunified and plural. And this is after more than six decades of attempts to unify them. Moreover, it turns out that this may be a permanent situation, since the very realities of scientific work seem to proliferate assumptions and practices that cannot easily be assimilated or integrated with existing ones. In addition, this situation of disunity can be desirable: it can advance both the objectivity of science and the benefits of social diversity. Furthermore, a compelling case can be made that philosophic stances toward a multiplicity of sciences will have to accept—and even value—a fundamental disunity in scientific ontologies and epistemologies; these, too, can bring significant scientific and philosophic benefits.

Finally, looking at these issues from another angle, historical studies have proposed that it was only political threats that forced mid-twentieth century philosophy of science to retreat toward the kind of logical empiricist (logical positivist) commitments to the singularity of sciences and their autonomy from society and, especially, from politics that so many of us were taught were the unquestionable commitments within which we could plan our own work. In the United States philosophy of science adopted such positions only when confronted with, on the one hand, the threatening political climate of McCarthyism and the Cold War and, on the other hand, an escalation in federal funding for scientific and technical research, beginning with the Manhattan Project, which created the atomic bomb, and continuing with the founding of the National Science Foundation. This very visible increase in state investment in scientific research stimulated leaders of the scientific community to insist that science would nevertheless remain autonomous from state politics. Thus, for sciences and their philosophies it was a strategic and political choice to try to protect scientific research from political interference by overtly rejecting political goals. It was not a purely cognitive issue of how best to advance the growth of knowledge. These recent

accounts by philosophers and historians suggest that by banishing appreciation of the multiple and often conflicting values and interests in good scientific research that people can have in different sociopolitical circumstances, the mid-century era adopted an antiintellectualism that blocked access to important resources for the growth of scientific knowledge and social diversity.

So it is not just the rise of global multiculturalism and postcolonialism that brings such new scientific, epistemological, and ontological questions into sharp focus. So, too, do some homegrown historical and philosophic sources of fresh thought about such issues. These changes also have the effect of decreasing the cognitive distance between modern Western sciences and other cultures' knowledge systems. What should be our standards for objective research in light of this recent work? What could constitute standards for fairness to the data and to our severest critics?

The next section points to how unity and disunity have persistently been adopted as moral and/or political commitments, reminds readers of the powerful allure of the unity arguments, and identifies three current narratives about what has led philosophers of science to explore more vigorously the disunity and pluralism of modern Western sciences. Later sections present several such accounts of the value of disunity, and identify sites of convergence and divergence between these homegrown philosophic reevaluations of disunity and those found in the postcolonial work on indigenous knowledge, as well as in other anti-authoritarian social movements. The final section considers ways to think about maximizing the objectivity of research in light of these reevaluations of the disunity of the sciences.

Unity and Disunity as Moral and Political Commitments

Historical Discourses versus Empirical Facts In our fascination with the disunity arguments, we shouldn't forget that unity has long been a political and social ideal, enshrined in the very names of the United States, the European Union, and, not so long ago, the Soviet Union (Galison 1996, 1). In fourth-grade history class, children in the United States learn of the struggles through which the American colonies, founded by then still hostile groups of different European national and religious exiles, joined to become a united nation-state: the United States, "one nation under God," as our Pledge of Allegiance proclaims. Political unity was not a natural or social fact, nor was it easily achieved. Today, in the midst of the European financial crisis and the ongoing struggles following

the Arab Spring, we are reminded of just how important and difficult it is to create unity in a shared world when it must be constituted out of relations between groups whose histories, identities, and projects are in significant respects in conflict—or at least tension—with each other. Even as we still struggle to create needed unities, calls for disunity, difference, autonomy, and independence reverberate across political debates around the globe; indeed, they are visible in discussions of the recent global financial crisis. Consider, for example, debates about the wisdom of one state or another withdrawing or being ejected from the European Union because of its bad financial practices. Keeping Europe's political economy unified is no easy task. And in the Middle East it has proven extremely difficult to create citizenries loyal to newly formed federal governments from groups who for millennia have been loyal first and foremost to their kinship groups.

Thus we can see that unity and disunity are not facts of nature or of social relations. They are not “out there” to be discovered, in the way that we were taught to think of the facts of gravity or tectonic plates as waiting to be discovered. Rather, they are usefully understood as discourses, as ways of making order out of the “blooming, buzzing confusion” of everyday experience.² Indeed, the related contrast between similarities and differences also are not “out there” to be found, but rather always require us to characterize phenomena in one way rather than another.

But what can account for the shift of interest in philosophy of science to issues of disunity and plurality? After all, this discipline has not tended to take philosophic illumination or stimulation from the likes of *Al Jazeera* or *The Wall Street Journal*. Moreover, the very thought of disunified sciences strikes fear into the hearts of many who in the Cold War era were taught never to question the exceptionalist and triumphalist stance of modern Western sciences and their philosophies (discussed in chapter 1). It is important to remember why that unity stance has seemed so compelling.

Specters of Disunity. Of course everyone recognizes that physics, chemistry, geology, crystallography, and genetics, for example, are different sciences. But the logical empiricists argued that such sciences can in principle and should in practice be unified into a coherent methodological, linguistic, ontological, and/or epistemological whole. They thought that our understanding of nature's order should in principle match what was presumed to be the coherence of that order. As philosopher Richard Rorty (1979) put the point, those who wanted to “relive the Enlighten-

ment” presumed that our minds (or at least, scientists’ minds) could become “glassy mirrors” that could reflect the order of a world that was “out there” for such reflecting. The 1950s philosophers were optimistic and proud to be part of the postwar exultation over the great power of the West’s scientific rationality and technical expertise to predict and control nature in ways that would improve life for everyone around the globe. They would have been in agreement with President Truman’s 1949 inaugural speech, quoted in chapter 1.

The uniqueness of scientific method could be accurately characterized, they thought. A materialist ontology must continue to replace the supernatural ones still found in folk thought and religious institutions, and in their practices and cultures around the globe. They feared that supernatural beliefs could again nourish hideous political projects. They assumed that a representational scheme could be identified within which all scientific descriptions of nature’s order could be articulated. Most important to them was that scientific realism be preserved, radical relativism be avoided, and that the rationality of science be appreciated in its uniqueness and practical powers. To be sure, these goals have not yet been met even today, the defenders of logical empiricism admit. The science we have is incomplete. But science is continually developing, they point out, and these assumptions are still the goals which the sciences should continue to seek. Of course, when speaking with each other, scientists and philosophers may have doubts about one or another of these assumptions, but they do not seem to be in favor of any of the alternative philosophies of science so far proposed by any of the anti-authoritarian social movements. To them, philosophically “flying by the seat of one’s pants” seems preferable to commitment to any alternative philosophy of science proposed so far, certainly in classrooms or when communicating with policy makers and their publics.

This vision of science continues to allure. In spite of the aforementioned social contexts that make disunity and pluralism seem reasonable and desirable, many scientists, philosophers, public intellectuals, and everyday citizens continue to find it painful to contemplate giving up this vision. On what do they focus when they are contemplating such pain? Such pain was visible in the “science wars” of the late 1990s, in which scientists and other intellectuals feared that theories and analyses by feminists and postmodernists were encouraging irrationality and disrespect in the public toward the benefits of scientific research, and thereby causing reductions in financing for scientific research.³ When the Cold War officially ended in 1989 with the fall of the Soviet Union, federal funding of some planned scientific and technical research projects

began to decrease. With such a decrease, the earlier steady increase in jobs for scientists and funding for grad students became more precarious. Some scientists blamed feminists and postmodernists for undermining public support for such projects. These scientists and the intellectuals allied with them were mostly unfamiliar with the field of science studies, and what little they did encounter they did not understand and consistently caricatured in their writings.⁴ It may seem obvious to feminists, postmodernists, and science studies scholars that these anxieties are groundless. Yet I suggest that at least residues of them obstruct for many educated people the possibility of gaining realistic understandings of the strengths and limitations of our own modern Western scientific and technical achievements. Such residues lead to the apparent “epistemological underdevelopment” of Western philosophies of science in the eyes of peoples from other knowledge traditions.

One focus of such concern about giving up the unity of science thesis is on how it could be reasonable to criticize sciences that are so reliable. Think of the knowledge, skills, and accuracy levels of airline pilots, space explorers, and weapons producers, not to mention heart surgeons and pharmacologists. The cultural “capital” of the natural sciences, its widespread high regard in the eyes of educated publics, seems challenged by the disunity theorists. How could it be reasonable to doubt that there is a single order to the universe that governs all phenomena, and that modern Western sciences can continue to identify, explain, and predict in ever greater detail?

Moreover, they think about how a multiplicity of sciences requires tolerating contradictions and inconsistencies between them. Such toleration eliminates reliable standards for settling conflicting knowledge claims. And it does so in fields far from the natural sciences that share standards for objective methods and reliable knowledge claims. How would our systems of justice work if conflicting knowledge claims could not be authoritatively settled? Tolerating contradictions and inconsistencies in claims about natural and social orders leads to dangerous public policies that provide support for powerful antiegalitarian forces, they argue. Concerns for democratic fairness and human flourishing require the refusal to tolerate any philosophy that refuses the well-tested rules for appealing to scientific facts in order to settle conflicting knowledge claims, as these critics see the matter.

Another source of resistance to accepting the idea of multiple sciences is the belief that modern Western sciences already encourage critical perspectives on traditional beliefs, from Galileo’s day to the present. And they encourage multiple perspectives on any particular scientific

issue. This is precisely what distinguishes modern Western sciences from dogma, as well as from folk knowledge and traditional belief, according to this view. There is plenty of room for rigorous and thorough criticism within existing scientific institutions and practices, defenders of the conventional philosophies of science argue. Thus, reliance on the rationality of thoughtful debate among experts is our best hope against the direction of research by unjust political power.

Finally (for our concerns here), they think about how these are not just reflections on a twentieth-century history that is well behind us. Virtually every day, we face refusals to recognize solid scientific facts—for example, about climate change, the evolution of species, and the causes of poverty. Moreover, the perpetrators of rape, child molestation, slavery, genocide, and other hideous social practices thrive on contrafactual claims that the victims desired or deserved what happened to them. Radio talk shows are full of the racist and sexist rantings of some of our citizens who refuse to consider facts of the matter (among their other limitations). After all, there are still groups in the United States who tell pollsters that President Barack Obama was not born in the United States and that he is Muslim. Disrespect for facts is widespread. From the perspective of such circumstances today, academics devoted to what can be perceived as abstruse theories of how facts are “socially constructed” are perceived as not helpful to the political need to confront and resolve issues of public policy in a multicultural, democratic society. If “anything goes,” in Paul Feyerabend’s (1975) famous phrase, we have lost valuable resources for designing public policies that can successfully overcome the already widespread disrespect for facts.

Of course the disunity theorists are aware of these issues. But they disagree with the positivist assumptions that are invoked in thinking about them. They think it important at least to explore alternative means to more multicultural democratic ends. At issue for the pluralists is how to leave logical positivism without also abandoning its great strengths. Yet the persistence of the conservative discourse suggests that leaving positivism behind will require deeper and broader changes in the political environment of the production of scientific knowledge today than philosophers of science have been able to imagine. As the disunity theorists have noted, ideals of unity and disunity are lodged deeply in national identities and public discourses in the West. They are not themselves natural or innate social facts “out there” for scientific recording. It may be that we have to rethink what philosophies of multicultural democracies should look like if we are to depart from what is increasingly perceived as the authoritarian grip of logical positivism and its echoes in

public life. My point here is that so far, that project lies beyond the horizons of the philosophic pluralisms in focus here.

So how is the recent emergence of these disunity and pluralism discussions explained?

Narratives of Philosophic Change Philosophers have given one or another of three accounts explaining how interests in diversity, disunity, and multiplicity that have gathered steam in recent decades have finally managed to reach philosophy of science. One narrative proposes that these recent interests in disunity, like ones in unity, are simply always “in the air” in the West’s intellectual and cultural histories, and they always are part of intensely felt moral and political concerns.

Unity. The very term has always evoked emotions. As a political call to arms, it rouses countries to civil strife, revolution, and international war. The theme of unity is written into the history of the United States, the (former) Soviet Union, and the European nation-states as deeply as any slogan can be. So, one should immediately add, are its antitheses—*independence and autonomy*. Little surprise, then, if the unification of the sciences, or the autonomy of the sciences, participates in broader cultural debates (Galison, 1996, 1).

Since the turbulent 1960s, unity has increasingly become associated with oppressive demands for assimilation into dominant cultures, loss of subcultural native languages and identities, and subservience to authoritarianism. Calls for the rights to social “difference,” for the autonomy of cultures and independence of subcultures, and for defiance of authoritarianism have appeared in virtually every institution in the West and around the globe in recent decades. Yet every week there seem to be new areas of social relations where such ideals are energized. We can hear echoes of these demands for autonomy today in the continuing Arab Spring and in Native American and other indigenous cultures’ desires to expand their sovereignty. From the perspective of this narrative, Feyerabend’s (1975) “against method,” wherein “anything goes” methodologically, was an early attempt to develop an anti-authoritarian philosophy of science. Today, such tendencies are again pursued in the new concerns with difference and disunity.

A second narrative proposes that it was the newly emerging historical and social studies of scientific practices some fifty years ago that eventually forced issues of disunity and pluralism to be taken up in philosophy

of science. Because scientific practices are and must be so diverse, the sciences should not expect to achieve the kind of singularity imagined in the unity of science thesis. The practical details of research are central to the latter's success.

Ever since philosophy of science took a historical turn in the 1960s, philosophers of science have paid close attention to the history of science and to contemporary scientific practice, and the use of evidence from case studies is often taken for granted in philosophical studies of science. Recent interest in experimentation, in the cultural setting of scientific work, and in anthropological studies of scientific laboratories by historians and sociologists has led to ever more detailed studies of the history of science and current scientific practice (Stump 1996, 255).

These studies began to focus on actual practices in scientific labs and field sites.⁵ The practices turned out to be far less orderly and respectful of the "logic of scientific inquiry" than philosophers had imagined. Scientists are guided at least as much by pragmatic concerns as by theoretical ones. The early sociological and historical accounts explicitly were intended to counter the epistemological authority philosophers had claimed for their idealized "rational reconstructions" of scientific research.⁶ Thus the very authority and legitimacy of logical positivism was openly at issue in the social studies of science accounts. Indeed, these accounts were performing their own resistance to what they regarded as the illegitimate authority of positivist philosophy of science! They were "seceding" from this part of the rule of logical empiricism.

As a result, some philosophers began to explore the possibility and consequences of giving up the typical armchair rational reconstructions of scientific inquiry and developing "naturalized" philosophies of science grounded in the new accounts of actual practices of working scientists. The cost of failing to take seriously the empirical evidence for disunity and plurality in the sciences was to face becoming irrelevant to the ways of thinking about them. What could be the point of a philosophy of science—a logical empiricism—that was neither grounded in nor illuminating of scientific practice?

But how deep down into ontological, epistemological, and methodological assumptions would this disunity and pluralism have to extend? It's one thing to recognize that the sciences themselves may not be unifiable. It is quite another to countenance the possibility that each of the most respectable epistemologies, ontologies, and methodologies of

modern science might be just one among many differently effective and valuable ones. Thomas S. Kuhn's (1970) talk of the "different worlds" of successive paradigms, of scientists' conflicting conceptual frameworks, and of epistemological breaks in the history of science raised such specters from the beginning (Lakatos and Musgrave 1970).

A third narrative proposes that twentieth-century philosophy of science was highly shaped by its powerful sociopolitical environment time after time. George Reisch's *How the Cold War Transformed Philosophy of Science: To the Icy Slopes of Logic* (2005) reveals the shift—an upending or reversal—in positivist philosophy of science in the United States during the mid-twentieth century. The interpretation of the "unity of science" prevalent since the 1950s was not the one initially intended by the originators of this phrase in the Vienna Circle. This third narrative tries to reestablish the earlier call for "harmonizing" sciences' research projects on behalf of solving social problems that otherwise will attract dangerous solutions. We return to this account shortly.

It seems reasonable to think that all three of these accounts are true. Interests in the ways the sciences are in fact disunified, and in the reality and value of disunified accounts of that plurality, are overdetermined by recent historical happenings. So just how are sciences, and perhaps even their philosophies, disunified?

How Are Modern Western Sciences Disunified?

Here we will look at how this question is understood in three recent publications: Peter Galison and David Stump's (1996) *The Disunity of Science*; Stephen Kellert, Helen Longino, and Kenneth Waters's (2006) *Scientific Pluralism*, and George Reisch's (2005) *How the Cold War Transformed Philosophy of Science: To the Icy Slopes of Logic*.

Recognizing the arguments in these three works can advance the project of this book in several ways. For one thing, Reisch's account provides details of how political implications of the unity of science argument were perfectly visible to philosophers of science again and again. Yet it was also for political reasons that these implications tended to be intentionally obscured. After all, there is something deeply contradictory, though perfectly understandable, about denying the political implications of one's claims, and about doing so for political reasons. Issues of the value-freedom or political commitments of the sciences and their philosophies were always entangled with the unity/disunity discourses. In the second place, these disunity arguments are aligned in certain respects with postcolonial claims for the inevitability and positive value

of a “world of sciences” and its epistemological, ontological, and methodological multiplicities. Yet, in the third place, attempts to make such alignments also encounter important differences between how the Western philosophers and the postcolonial theorists think about unity and disunity. This should occasion further reflection by Western philosophers on their disunity positions, I propose.

This section will introduce the arguments of these three books. The following section will identify the convergences and divergences between these philosophies focused on Western sciences and the postcolonial ones that focus both on Western sciences and on indigenous knowledge traditions.

Suppes and the “Stanford School” of Philosophy of Science In Patrick Suppes’s 1978 presidential address to the Philosophy of Science Association, he pointed out that science already was apparently irreducibly plural in several significant respects. It used incompatible multiple languages, focused on multiple kinds of subject matter, and had been unable to establish any unity of method in spite of vigorous attempts to do so (Galison 1996, 8; Kellert et al 2006, vii; Suppes 1978). Here is Galison commenting on how Suppes explicitly linked the disunity of science with desirable disunities in democratic societies more generally.

“Personally,” he wrote, “I applaud the divergence of language in science and find in it no grounds for skepticism or pessimism about the continued growth of science. The irreducible pluralism of languages of science is as desirable a feature as is the irreducible plurality of political views in a democracy” (Suppes 1978, 3–16). Plurality of views, democracy—these could, in the fourth quarter of the twentieth century, find a comfortable set of associations in talk of disunity (Galison 1996, 8).

Most philosophers ignored Suppes’s argument. But a few arrived at similar conclusions. Particularly notable have been studies of the thinking of Vienna Circle cofounder Otto Neurath by Nancy Cartwright and her collaborators (1998), Cartwright’s (1999) own pluralistic account of how the laws of physics form only a loose patchwork of a “dappled world,” John Dupre’s (1993) examination of a “promiscuous realism” created by different human interests in classifying things; and Ian Hacking’s (1996) studies of different styles of reasoning.

Peter Galison (1996) described the “local trading zones” organized by teams of scientists from different scientific subcultures as they seek to

develop from their distinctive disciplinary histories new classifications and practices that are “good enough” for the work at hand. They are challenged to develop these out of what Kuhn (1970) has characterized as “incommensurable frameworks.” Galison and Stump’s 1996 collection emerged from a 1992 conference at Stanford, and it brings together analyses focused on the existence, importance, and implications of disunity in the sciences. These authors struggled to assess, some five decades after the unity of science project was initially formulated, just what still deserved to be pursued of the original unity project, and how to think about what now appeared to be the attractions of disunified sciences. Ian Hacking (1996) notes that not even the idea of unity is unified (42). He identifies diverse blends of two different ideas in philosophical pronouncements about unity: singleness and integrated harmony. He finds “a metaphysical sentiment, three metaphysical theses, three practical precepts, and two logical maxims” in philosophers’ uses of unity (52). He proposes that “it helps to see how unrelated these are by noticing the different weights of singleness and harmony in each one” (*ibid.*).

Kellert, Longino, Waters, and the “Minnesota School” A decade later, the collection edited by Kellert, Longino, and Waters (2006) presented ten papers from a 2002 workshop at the Minnesota Center for the Philosophy of Science. Most of the contributors mapped the nature and causes of plurality in particular sciences: color vision, quantum dynamics, gene-centered biology, mathematics, economics, studies of behavior, explanations of the evolution of sex, and the social studies of science itself. This, in itself, is illuminating. However the editors distinguish this project from a second one. They propose that their contributors’ accounts justify the development by the editors of a manifesto for scientific pluralism as a philosophic stance. This philosophical stance differs from the *de facto* plurality in the sciences documented by their contributors. The logical empiricist unity of science was committed to a single authoritative philosophical account of the underlying unity of the sciences—a monist philosophic account, as the editors call it. In contrast,

scientific pluralism . . . holds that there are no definitive arguments for monism and that the multiplicity of approaches that presently characterizes many areas of scientific investigation does not necessarily constitute a deficiency. As pluralists, we do not assume that the natural world cannot, in principle, be completely explained by a single tidy account; rather we believe that whether it can be so explained is an open, empirical question (x).

They argue that because there is not now any viable argument for a “monist” account of that plurality—that is, a compelling argument for the unity of philosophies of science—there can no longer be any good reason to find fault with assumptions of philosophical pluralism about the sciences.

The studies in this book lead, we argue, to a substantial and consistent form of pluralism that is not so much a metaphysical or ideological position about the fundamental character of the world as an approach to interpreting the content and practices of scientific inquiry. We call this approach “the pluralistic stance,” by which we mean a commitment to avoid reliance on monistic assumptions in interpretation or evaluation coupled with an openness to the ineliminability of multiplicity in some scientific contexts (xiii).

Their questions are: “Can pluralism be consistently advanced in philosophical interpretations of science? If so, what are the implications of taking a consistent stand on pluralism?” (ix). That is, they propose an end to criticisms of philosophic works that do not assume the possibility and desirability of “a single tidy account” of the existing disunity of scientific languages, methods, and ontologies. And this is to be an empirical stance, not an a priori metaphysical assumption or a political program. In the next section I will argue that leaving such questions open is indeed an attractive move. However, specifying that these questions must be empirical ones seems problematic on both cognitive and political grounds.

Reisch In 2005 appeared George Reisch’s extended study of the Vienna Circle’s Unity of Science social movement and how it was transformed when it encountered McCarthyism and the Cold War in the United States. Glimpses of this kind of account had already appeared in Cartwright and her colleagues’ studies (1998) of Neurath, and in the writings of the other Stanford disunity philosophers and historians. Heather Douglas (2007) reports part of this account, and Alan Richardson (2006) pursues parts of this history in his contribution to the Minnesota collection.⁷

The logical empiricism that I and my generation learned in graduate school, and that still is the dominant philosophy of science in leading graduate schools in the United States (with some modifications, of course), traced its roots to the circle of philosophers of science who

began meeting in Vienna in the 1930s—the Vienna Circle. These philosophers were virtually all socialists, and many were Jewish. Their new philosophy of science was committed to creating a multiple-science program (a “unified” or “harmonized” program) that would address the social problems to which fascists were beginning to provide hideous “solutions.” So the call for unity here is a call to a shared research project; it contrasts with scientists choosing (disunified) research projects with no thought about coordinating research to address a shared agenda. But the contrast between unity and disunity had a second appearance in this era. From the fascists’ perspective, Jews, homosexuals, gypsies, and socialists were “different” and, in the worst case scenarios, should be eliminated in order to secure the “health” of an Aryan social order. “Disunity” and “difference” in this context signified the Aryan-supremacist, racist policies of Nazi fascism and the eugenics principles it had learned from earlier US and British science (Proctor 1991; Stepan 1982). It contrasted with a humanity shared by all persons: Aryan, Jewish, or of whatever race, culture, gender, or sexuality.

When these philosophers escaped from the holocaust by emigrating to the United States, they came under the unfriendly focus of McCarthyism and felt forced to give up the social and political commitments of their philosophical work. Under such conditions, the emigrants from the Vienna Circle were forced to abandon the progressive political agenda they had established for the sciences of their Vienna days. To continue pursuing such an agenda would have put them at risk of prosecution as communists. Reisch documents how institutional changes in philosophy of science also occurred in this context. The Vienna Circle itself and its journal, *Erkenntnis*, were replaced by the Philosophy of Science Association and its new journal, *Philosophy of Science*. For the Vienna Circle, the Unity of Science *social movement* had never intended to reduce or translate the languages, methods, models, or theories of the sciences into one, logically coherent, fundamental theory from which all the special sciences could be derived. Yet that was the *thesis about the sciences* that the US positivists and their new institutions advocated (Hacking 1996). So a program in Vienna to coordinate scientific work in order to block fascism was transformed in the United States into a claim about the nature of science.⁸

Thus, the Reisch book makes clear how powerfully politics shaped philosophies of science in two different eras. First, the philosophy of the Vienna Circle was articulated in ways that could contribute to resisting the horrors of fascism. Then, later, it was reshaped to acquiesce to philosophic positions that would not attract the unfriendly focus of

McCarthyism and Cold War intellectuals. The mid-century philosophy of science that many of us learned had been twice shaped intentionally in response to political threats.

I have no recollection of hearing about this history. Reviewers of the Reisch book confirm that this shift was not at all obvious to those of us in the United States who learned the principles of logical empiricism in the 1960s and later. Moreover, this particular set of influences by local politics on the basic assumptions and projects of philosophy of science was certainly not a unique phenomenon. One can see that the anti-authoritarian social movements of the late 1960s again raised issues of the importance of “disunity” with authoritarian projects, and in the context of the Vietnam War, scientists, philosophers, and social studies of science began projects with different goals and practices.⁹

Most important for our project can be the recognition that the Cold War has now been over for two decades. It is a reasonable implication of the Reisch account that this fact gives us additional reasons to re-evaluate the status of the philosophies of science that seemed so universally justifiable and desirable during the McCarthy and Cold War years. What should be saved of logical positivism in such a reevaluation?

Convergences and Divergences

How do the themes of these recent philosophic and historical accounts align with insights from the postcolonial reevaluations of indigenous knowledge traditions that were discussed in chapter 4? How do they move in different directions? Here the focus will be on just two issues: interests in disunity and unity, and attitudes toward scientific realism versus radical relativism.

Interests in Disunity and Unity The meanings of and interests in unity and disunity are different for postcolonial science studies and other such theories of “sciences from below” than they are for almost all the Northern philosophers discussed. The primary meaning of “unity” for the latter would be the exceptionalist and triumphalist insistence that modern Western sciences are the only “real sciences.” There is one world “out there,” one “truth” or order to nature, one and only one science capable of capturing that order, and one and only one society capable of producing that science: ours in the modern West! This exceptionalist understanding of modern Western sciences takes the differences between modern Western sciences and other culture’s knowledge systems to be defects in the latter. It takes the social elements of other sciences to be

sources of defects in their accounts of nature. Such defects provide legitimate reasons to disqualify the latter as part of that “one science” that is modern Western science.

In contrast, for postcolonial science studies, unity means enforced assimilation to modern Western sciences and destruction of the resources and the rights of other cultures to design and manage their own “different” knowledge systems. From this perspective, modern Western science and its philosophy have been and remain destructive of other cultures, of the environments upon which all life depends, and of other cultures’ knowledge traditions. Moreover, these Western philosophies create widespread misunderstandings and ignorance about their own locations in human history—for the postcolonial critics, Western philosophies of science are “epistemologically underdeveloped.” The triumphalism of these philosophies exhibits ignorance of their effects on other societies and on their self-understanding. For these postcolonial critics, disunity would be represented by the insistence that modern Western science is just one of many culturally local sciences that create the legacy of human knowledge production. Thus, postcolonial interests are focused on differences between the knowledge systems of different cultures, but also on the hierarchical relations between them. The postcolonial theorists argue that indigenous knowledge systems are better—more useful, less destructive—for indigenous societies than are modern Western sciences.

The postcolonial interest in disunity represents a theme that appears also in the other anti-authoritarian social movements that began to emerge in the 1960s and 1970s. Feminist, antiracist, anticlass, queer, and disability social movements were developing theories about the plurality of sciences around the globe and programs to advance sciences with different agendas and methods than those of modern Western sciences and its philosophies. Recognition of multiplicity in philosophic positions about this “world of sciences” appeared in this work as it focused on the different metaphors, models, ontologies, and epistemologies of, for example, Native American and African environmental projects, or contemporary Asian health and medical projects. Feminists argued that gender relations in the West sometimes led men and women to make different ontological and epistemological assumptions about themselves and the world around them, and it was a problem that only men’s ways of seeing the world were legitimated by dominant social institutions (for example, Harding and Hintikka 1983/2003).

There is a strong sense in most of this literature that it would be a tragedy were there to come to be a “single tidy account” of nature’s order—that is, if there were to be one and only one science in the world.

Only an intensely authoritarian global society could succeed in creating the existence of just one science everywhere around the globe. In such a world, rich resources would be lost that economic, political, social, and other differences between cultures have provided. With such resources, different societies and their sciences can co-constitute each other in ways that respond to their kinds of local interaction with their natural and social environments. The environments themselves change, and so do social needs and desires. As one could suspect when starting off thinking about the value of disunity and multiplicity from the standpoint of less powerful societies, these possibilities have different meanings than they do to Northern philosophers of science.¹⁰

There seems to be no place in the “pluralism stance” of Kellert et al. where one can find the possibility of acknowledging, let alone advocating, “a world of sciences” in the sense this has for postcolonial science studies and for the other anti-authoritarian science studies movements. Of course Kellert et al. have what they would see as a different project: they are trying to delegitimize philosophic “monism” as the *only* reasonable view of the obvious pluralities in scientific assumptions and practices. Yet they do not think there are compelling reasons to decide that, considering all evidence available now, it is unreasonable. It is inherently a flawed position: “We do not assume that the natural world cannot, in principle, be completely explained by a single tidy account; rather we believe that whether it can be so explained is an open empirical question” (x–xi).

There is an admirable element to this otherwise problematic claim. This is that neither scientific nor philosophic positions should claim complete closure. Every claim and position should be left open to further discussion as new conditions and perspectives emerge. Yet to insist that this must be an “empirical question” fails to recognize that the unity and disunity of nature and of theories about nature are discourses, not facts. And at this moment and place in history and social relations, the unity position discounts the value of a “world of sciences” to non-Western societies as well as to Western ones (as described in chapter 3). In his contribution to the Kellert collection, Alan Richardson notes that the debate over the reliability of indigenous knowledge, such as that of the indigenous salmon fishing communities of the Pacific Northwest, “is the crux of the matter regarding unity and plurality of science” (18).

Thus, one person might argue that it is multiculturalism gone berserk to expect that fisheries scientists should have to listen to native claims of knowledge of salmon breeding habits—this is

the functional equivalent of insisting creationists have a voice in biological debates. But another might argue that the accounts of the native fishing communities in fact do form the best evidence we have of changing salmon populations in the coastal waters over the long term, and after all, it is racist to deny that there is aboriginal expertise that should be heard in the debates. Someone might even argue that the native ways of interacting with the environment are more likely to yield knowledge of what is happening with the fish, a claim that sounds like a sort of romantic fairy tale to others (ibid.).

Thus the possibility of a singular, universal science, a “theory of everything,” is the possibility of a dangerous motor of authoritarianism that does now and will in the future be used to support antidemocratic policies and practices. But Richardson’s insight does not influence the editors’ position. One can see here how it is going to take vigorous advocacy and activism to protect more vulnerable societies, their sciences, and their philosophies from disappearing with accompanying losses to everyone.¹¹

No Universal Realism, No Radical Relativism Since Thomas S. Kuhn’s *The Structure of Scientific Revolutions*, philosophers and many scientists have feared that the science studies focus on social elements of science threatens scientific realism (Lakatos and Musgrave 1970). In recent years, philosophers and scientists with residual positivist tendencies continue to worry that acknowledging the value of the social constructivist tendencies in the history, sociology, and ethnography of modern Western sciences opens the door to justifying supernatural worlds and to a radical epistemological relativism.

The focus on local scientific practices played a significant role in drawing attention to the value of disunity in science, as noted earlier. It is precisely this focus on local practices that secures a realist materialism *without arguing for* it and at the same time blocks a pernicious relativism. It is worth taking a moment to see just how issues of universal realism and radical relativism can be blocked in ways that some of the disunifiers have spelled out.

It is the residual tendency to seek global, universal epistemological guarantees for the reliability of modern Western sciences that continues to fuel fears of the undervaluation of nature’s powers and the legitimation of a pernicious cultural relativism. David Stump (1996) is one of several philosophers who have articulated a widely shared argument

against the tendency to revert to global, universal standards when confronted with the local nature of scientific practices. Stump presents a kind of manifesto for a disunified philosophy of science. He identifies how it is precisely the disunity of scientific *practices* that rightly earns the sciences such immense scientific and political power. It is the disunity of scientific work that enables scientific practices that are indeed shaped by historical and cultural influences to nevertheless produce reliable results of research. Drawing on the work of Peter Galison, Ian Hacking, and others, Stump focuses on the necessity of making it impossible to articulate the topics of the most agitated post-Kuhnian debates, especially those about rationality, realism, and relativism. That is, he proposes closing the doorways through which philosophers and others enter such debates. These topics all require “global arguments,” he points out, and these are to be resisted.

Traditionalists and their relativist doubles both assume that there is a large area of human knowledge called science and that it is meaningful to ask whether science is justified absolutely, as universally valid. The common argument of both traditionalists and relativists is that the reasons that nonfoundationalists argue can be offered for acceptance of theories and experimental results beg the question, because these are only reasons according to local standards, and these standards can be called into question. Both claim that we need transcendental (universal and/or fixed) standards by which to judge our beliefs if we are going to say that we know (261).

In Stump’s program there would be no epistemic space to raise questions about the rationality, realism, or relativism of sciences as understood by post-Kuhnian science studies. How does he manage this feat?

Stump notes that it was Kuhn, Feyerabend, and other philosophers of their era who introduced the possibility that relativism was going to be a serious challenge to philosophies of science—not just to attempts to justify moral principles, where it had found a home for more than two millennia. For these philosophers, scientists in the thrall of different research paradigms lived in “different worlds.” The “incommensurability” of those worlds made it exceedingly difficult to convince devotees of one paradigm to leave it behind and migrate into the lived world of a competing paradigm. Young scientists could be recruited into the world of a new paradigm. But usually, Kuhn claimed, the older ones could not be enticed and their paradigm would be abandoned only when they had

all died out. Kuhn introduced a metaphysical solution to an epistemological problem, Stump points out. How can we explain why a scientific community shifts from one model of research to another? These models (“paradigms”) mark out different ontologies—different worlds.

But this argument about epistemological paradigms and their incommensurable worlds created the relativist challenge to the social studies of science. Kuhn and Feyerabend were widely criticized for these kinds of claims (Lakatos and Musgrave 1970). Yet Willard Van Orman Quine (1960), too, had posed the epistemological problem: he insisted that observations can never be completely independent of the theories they are supposed to be testing. Scientific and everyday thought form a continuum, a “network of belief,” with no sharp break dividing one from the other. Thus everyday, culturally local assumptions and practices make some theories look more reasonable than others. Moreover, theories are always underdetermined by their observations. There is always more than one theory that will fit any possible set of observations. Thus it seemed that scientific thought could never escape constraint either by theoretical or by everyday cultural assumptions. Scientific realism was endangered by an apparent radical relativism.

Stump points out that this widely shared view misses the fact that scientific practice has “a life of its own,” as Galison (1996b) and Hacking (1999) had argued about laboratory practice in particular. In the laboratory, scientists resolve challenges pragmatically, often with little regard for whether the chosen solution is perfectly coherent with the commitments of the hypotheses that they are testing or philosophers’ principles of good research. The chosen solution simply must be “good enough” to meet the practical challenge at hand. Consequently, the very best science is always an assemblage of heterogeneous elements.¹² It is precisely this pragmatic heterogeneity that gains the results of scientific practice at least some small but significant degree of independence from hegemony of the theory being testing. This heterogeneity insures that some elements of scientific practice are at least relatively autonomous from the scientist’s theoretical commitments and thus can indeed do the kind of critical work for which the sciences are so valued. Here is an epistemological solution to the epistemological problem that Kuhn’s work brought into focus. Here we have another, crucial, kind of disunity *in* each and every science. Here is another reason why at least some of the disunities of science are not just to be tolerated, but rather should be highly valued. This kind of disunity, too, is a source of sciences’ objectivity and creativity.

This way of resisting yet more tiresome debates over realism and relativism does align well with these tendencies in the postcolonial and other

anti-authoritarian philosophies. Their sciences have been grounded in their particular, local knowledge production practices. The materiality of their understandings of nature's order and their immunity to raising issues of pernicious relativism are both secured by the exigencies of knowledge-seeking practice. And in this last discussed kind of disunity we can see another reason to resist the temptation to rank modern Western sciences higher than other cultures' knowledge systems on the grounds that the others do not possess consistent logics of scientific inquiry. It is precisely the pragmatic, local practices of scientific work that mitigate the otherwise potential damage of the underdetermination of theories by their evidence. Yes, they are still underdetermined. Nevertheless, the heterogeneity of research practices successfully ties the results of research to local material realities.

These two issues reveal that not all disunity and pluralism tendencies in Northern philosophies of science align well with the anti-authoritarian social movement goals. But at least some recent insights do.

Objectivity

As discussed earlier, historical studies have identified how threats from McCarthyism and the Cold War lead philosophers of science to eliminate from their theories any overt commitments to the kinds of progressive agendas for the sciences that had animated the Vienna Circle. Under such threats, these philosophers gave a new referent to the Vienna Circle's commitment to the Unity of Science. Where for the Vienna Circle this had been a social movement to direct scientific research to pressing social problems, for the logical empiricists threatened by McCarthyism it became a thesis *about* science. Maximizing objectivity under this new regime meant restricting philosophy of science concerns "to the icy slopes of logic," as George Reisch put the point. Gone from this philosophy of science was a commitment to progressive social transformation.

The consequences of this shift have been "tragic," philosopher Don Howard points out. "By the end of the 1950s, thoughtful philosophical debate about the place of science in society had all but disappeared, replaced by a highly formalized philosophy of science pursued by a new generation of technically well trained young specialists whose inability to think carefully about science in context was disguised as disdain for irrelevant, non-technical questions" (Howard 2009, 201). Yet plenty of other people have interests in taking up issues about the place of science in society, as Howard notes. "But questions about science's social role remained, and others stepped forward to answer them. We now have

apologists for theologically debatable religious interests telling the public that intelligent design is ‘scientific.’ We have apologists for corporate greed telling the public that predictions about global warming or species extinction are not based on ‘sound science’ ” (ibid.).

However, by several decades later, the president of the Philosophy of Science Association could assert the value of still obvious disunities in the sciences in terms of the value of disunities in democratic political life, as noted above. And as attempts to depart from positivism multiplied, here and there disunity theorists pointed to the reality that unity and disunity were omnipresent discursive positions in modern societies, not facts “out there” in nature’s order. A few theorists have begun to raise issues about the expertise of indigenous knowers. And the anti-authoritarian social movements that emerged in the 1960s have developed research practices that, one could say, return to the Vienna Circle’s commitment to embed emancipatory politics in the very practices of scientific research. They do so when they use a standpoint methodology, or “logic of research,” that produces “strong objectivity” practices.

In the Kellert et al. collection, philosophers of science directly proposed abandoning the authority of “monistic” claims about the obvious disunities of science. Yet powerful residues of the unity of science *thesis about* sciences remain wherever the philosophic attempts to defeat it continue to avoid thoughtful consideration of the role of science in society and society in science: how sciences and their societies co-produce each other. It is one problem that the favored hypotheses of oppressed groups so rarely get to the starting point of scientific research projects. It is another that dominant values and interests function as evidence throughout research processes but are exceedingly difficult to detect from within scientific communities.

In the next chapter, we will see that the assumption of a distinctive Western secularist stance makes it difficult for Westerners to gain an accurate grasp of the empirical reliability of other cultures’ knowledge systems. Moreover, it obscures to Westerners the place of our sciences and their philosophies in “a world of sciences.” It also blinds science studies scholars to ways in which not only religious and spiritual commitments but also secular ones are always culturally specific forces that for better or worse shape the sciences of their day as those sciences, in turn, provide resources for such cultural commitments. Should this Western secularist stance be added to the typical list of oppressive “isms” (sexism, racism, etc.) that all too often block maximally objective accounts of ourselves and the world around us?

6

Must Sciences Be Secular?

Can knowledge systems embedded in religious and spiritual beliefs and practices nevertheless be objective? Chapter 4 looked at indigenous knowledge systems. These tend to exhibit the religious and spiritual commitments of their societies. This is perhaps the aspect of their cultural features most alienating to Westerners. From their origins half a millennium ago, modern Western sciences positioned themselves against the “enchanted world” — that is, against the idea that our lives and environments are designed, managed, and permeated by supernatural forces. This commitment has again and again been rearticulated by Westerners up through the present era, especially at times of emerging religious authoritarianism. For example, here is physicist and philosopher Rudolf Carnap explaining in 1963 the motivations of the philosophers of science who formed the Vienna Circle in the context of the looming antisemitism and fascism in Germany and Austria before World War II:

I think that nearly all of us shared the following three views as a matter of course which hardly needed any discussion. The first is the view that man has no supernatural protectors or enemies and that therefore whatever can be done to improve life is the task of man himself. Second, we

had the conviction that mankind is able to change the conditions of life in such a way that many of the sufferings of today may be avoided and that the external and internal situation of life for the individual, the community, and finally for humanity will be essentially improved. The third is the view that all deliberate action presupposes knowledge of the world, and that the scientific method is the best method of acquiring knowledge, and that therefore science must be regarded as one of the most valuable instruments for the improvement of life (Carnap 1963, 53).

This secular stance has been a founding feature of the legacy of what is regarded as enlightened Western thought.

It also remains deeply embedded in educated Western identities today. Of course many scientists in the Global North do regularly participate in religious practices. Yet the vast majority of them would insist that their professional production of scientific facts is not shaped by their religious or spiritual experiences, commitments, or practices. When confronted by claims that conflict with those considered scientifically legitimate, whether the cited evidence for the claims has been produced by tobacco companies, pharmaceutical companies, Christian Scientists (the Protestant denomination), or defenders of creationism and intelligent design, scientists always step up to criticize the faulty claims and the lack of objectivity in their production. For example, in court and media struggles over whether children should be taught creationism and intelligent design instead of, or alongside, evolutionary theory, scientists have again and again testified to the reliability and research fruitfulness of evolutionary theory and the lack of scientific evidence that could support the biblical arguments.¹ They are not objecting only to a particular case of error that happens to originate in using the Bible as a source of theory or data, but to the very idea and practice of using any religious text as a source of facts or explanations about nature's order. In another context, sometimes doctors testify against parents whose religious beliefs forbid medical intervention for their sick children who are nearing death. They point out that scientific facts show how to keep those children alive. They ask for the courts to remove those children from their families in order to save their lives. So there are plenty of examples around us of scientists insisting on secular ways of producing claims about nature's order.

This secular stance has been sufficient by itself for educated Westerners to feel justified in treating many non-Western knowledge systems, such as those described in chapter 4, as failing to qualify as sciences. Yet

such disqualification has materially discriminatory effects on those societies. It becomes an obstacle to the social and material flourishing of non-Western cultures when Western modernization projects insist on providing development resources to such societies only for the transfer of modern Western scientific rationality and technical expertise.² Such projects refuse to value, protect, and provide resources so that indigenous knowledge systems can flourish and benefit the indigenous people who developed them.

Yet the issues here are even more complex. Critics have recently pointed out that the secular stance poses additional challenges in the Global North: it is also an obstacle to the ability of Northerners to understand *our own* sciences. While modern Northern sciences today insist on their official secular identities, science intellectuals from the Global South point out that actually ours is a distinctively Christian and even Protestant secularism. It turns out that every religion produces its own secularism (or maybe several). Furthermore, Northern secularism consistently misreads the nature, practices, and benefits of religious and spiritual commitments for indigenous and other cultures. Finally, rethinking Northern secularism in such ways has implications for how we think about the multiculturalism and democracy of our multicultural democratic societies, within which our sciences are produced. This is an issue for our own local multicultural democratic societies, and also for the global form of such governance enacted through international agencies and the international relations of nation-states. How should such societies adjust, if they should do so, to such new understandings of secularism? Can sciences directed by or aligned with secularism actually maximize the objectivity of their research projects? On the other hand, can sciences with religious/spiritual commitments nevertheless still maximize the objectivity of *their* research projects?

The first section of this chapter focuses on tensions and contradictions in how the conflict between secularism and religion appears in our world today. The second section focuses on recent discussions in the humanities and social sciences about the surprising return of religion to the public sphere—surprising because modernization was supposed to bring about the decline of religion in the public sphere.³ The third section points to some insights from science studies that align with defenses of indigenous knowledge as “real science.” Earlier we noted five such alignments; here are two more. The fourth section identifies some distinctive issues that arise in thinking about women’s relation to religion and to secularism. The concluding section suggests several insights from these various discussions that will enable

us to move forward in thinking about secularism and objectivity in research.⁴

The Secularist Stance in the West

The distinction between secular and religious/spiritual commitments is central to the multicultural democratic states in which Western sciences have developed. Of course today most US citizens believe that multicultural, democratic states must not discriminate against the religious and cultural practices of their constituent citizen groups. They must not favor the practices of one group over the practices of others. The first such multiculturalism articulated in the United States was concerned about the equal rights of Catholics and Protestants who had arrived in North America from the religious wars in Europe. (None of the statesmen of the day seemed concerned about respecting Judaism, Native American religions, or the African religions brought to the Americas by slaves.) The United States government would insist on the separation of church and state.⁵

From its origins, European-American secularism has been associated with the Enlightenment, liberal democracy, modernity, and later modernization theory. Thus the binary of secularism versus religion provides support in varying degrees for a number of other familiar binaries (Jakobsen and Pellegrini 2008b, 6). The binaries of reason versus dogma and progress versus backwardness have most often benefited from their association with the secularism versus religion binary, in turn strengthening the appeal of the latter. One can also encounter the secularism-versus-religion binary associated with the contrast between universal and particularistic commitments, and with freedom versus bondage. Secularism is thus a moral and political project—not the absence of such projects, as is usually assumed. Its material and linguistic practices work over multiple institutions. Thus, to give up the secularism-versus-religion binary is to lose benefits of the other binaries. So the stakes are high in supporting secular societies and secular sciences against religious influences and commitments.

Societies around the globe are becoming ever more extensively inter-linked through the expansion of popular culture, communication, travel, and capitalism. They need to confront shared problems such as global warming, migration, pandemics, the management of oceans and other shared resources, the sex trade and other illegal activities, warfare, and terrorism within and between states. This shrinking of the global village within the prevailing global social order extends the Western secularist

stance into new areas while it also seems to bring it face to face with its limitations.

One such limitation appears to be created by Westerners' discomfort with the increased presence of Muslims in Europe and North America, by the terrorism committed in the name of Islam, and by the rising political power of Islamist parties in Arab and other nations. Again and again, protests have been mounted in the West against the supposed claims and practices of Islam ("supposed" since so many generalizations about Islam are regularly contested by other groups of Muslims) or against the very presence of Muslims in the West. These phenomena seem to be testing the limits of liberal tolerance of cultural difference that is so central to Western multicultural democracies. These Western states, as well as the international institutions and agencies they have designed, have prided themselves on such tolerance as models of modernity and of social progressiveness (Levey and Modood 2009). Yet recently Human Rights Watch "has urged the West to accept the new reality that Islamist parties are the rising political powers in Arab nations where secular autocratic regimes were toppled in last year's so-called Arab Spring movement" (Hassan, 2012, A4). The executive director of Human Rights Watch, Kenneth Roth, points out that "Islamic parties are genuinely popular in much of the Arab world, in part because many Arabs have come to see political Islam as the antithesis of autocratic rule" (ibid.). Unfortunately the West has tended to support autocratic rulers in order to secure reliable oil supplies and "to maintain Arab-Israeli peace" (ibid.).

Another limitation is created by increased recognition from diverse groups in the West as well as around the globe that the secularism versus religion binary is neither as obvious nor useful as had been supposed. This issue is taken up later in this chapter. To many non-Westerners, ironically, the secular stance signifies intolerance and disrespect for their cultures. The Christian "right" in the United States also experiences secularism as intolerant and disrespectful of *their* "culture"—in this case, of its Christian culture. It agitates, for example, to restore Christian celebrations in public schools, and crosses and other Christian symbols on federal and state lands.

To non-Western critics, Western secularism is also seen as a symptom of the Western lack of critical self-analysis regarding what appear as clearly religious and cultural values and interests that also infuse Western sciences and their philosophies, as well as other supposedly secular social beliefs and practices. Thus the Western secularist stance appears distinctively Christian to many non-Western observers in spite of secularists' assumption that they have specifically given up being observant

Christians. It appears to non-Western observers as part of the “epistemological underdevelopment” of modern Western sciences and their philosophies (Nandy 1990). As the science and technology intellectuals who constitute the Third World Network propose:

Given the destructive nature of contemporary science and technology, and the fact that it is controlled and directed by industrialized states and multi-national corporations, it is essential for Third World countries to create their own indigenous bases for the generation, utilization and diffusion of scientific and technological knowledge. . . . Only when science and technology evolve from the ethos and cultural milieu of Third World societies will they become meaningful for our needs and requirements, and express our true creativity and genius. Third World science and technology can evolve only through a reliance on indigenous categories, idioms and traditions in all spheres of thought and action (Third World Network 1993, 326).

Yet to educated Westerners, the intellectual status of our sciences as universally and uniquely valid has depended on contrasting them with just this sort of “reliance on indigenous categories, idioms and traditions.” So, too, have the moral energy and political value created by pride in our sciences depended on such a contrast.

How ironic that Western secularism, initiated to support tolerance of multicultural religious communities in democratic states, now appears to so many people around the globe (including fundamentalist Christians in the United States) as a vehicle of religious intolerance, an obstacle to democratic social relations, and a symptom of the epistemological ignorance and backwardness of the modern West! What is to be done?

One might think that this is not a propitious moment to be raising this issue in the United States or Europe, in light of a rise here of intolerant and sometimes violent religious fundamentalisms, increasing demands for state policy religious commitments, and tolerance of discriminatory religious influence in the public sphere. Yet, perhaps as part of the diverse response to these new crises of secular states, the topic of rethinking secularism seems to be moving to the foreground of at least some current Western intellectual and political debates. For example, the Social Science Research Council (SSRC) in the United States has three ongoing projects on such topics: “Religion and the Public Sphere,” “Religion and International Affairs,” and “Spirituality, Political Engagement, and Public Life.” Additionally, SSRC’s “The Immanent Frame” is

a collective blog that “strives to impact contemporary debates on religion, secularism, and the public sphere in a manner consistent with the SSRC’s mission of producing social science for the public good.” SSRC projects have produced illuminating writings on these topics, including *Varieties of Secularism in a Secular Age*, (Calhoun et al. 2010), and *The Power of Religion in the Public Sphere* (Mendieta and VanAntwerpen 2011).

Another valuable discussion about how state commitments to secularism should be understood has been instigated by historians who remind us how recently religion has been *disestablished* in the United States. Of course the sixteen words of the First Amendment to the US Constitution establish religious freedom for the citizens of the new state. But just what these words did or should mean was contentious to the Founding Fathers, and has remained so to this day (Hamburger 2002; Waldman 2008). In effect, Protestantism was firmly established in US government institutions until 1972, when the requirement of a school prayer was finally outlawed. Today, as in its history, the US government remains supportive of some religious practices, such as funding “faith-based organizations” to deliver kinds of social support that the government doesn’t want to pay for. Yet its tolerance of state involvement in other religious practices remains controversial. As I write, the US Supreme Court is probably going to have to decide whether private corporations whose owners’ religious commitments disallow the use of contraceptive devices may refuse to include such services in the government health insurance program (“Obamacare”) they are now required to make available to their employees.

So it is in these intellectually, politically, and philosophically fraught and turbulent contexts that the arguments here are positioned. What are the problems with Western ways of thinking about secularism that have been identified in the West and in other cultures?

Skepticism about Secularism

Sources Skeptical arguments in the West about the classic secularism narrative have been arising for almost half a century. There seem to be at least three main sources for such skepticism (Jakobsen and Pellegrini 2008b). One was the emergence of anti-authoritarian social movements and postcolonial criticisms in the West since the 1960s. A second was the economic recession of the 1970s, in which it became painfully visible that Western modernization policies had in fact produced a great deal of de-development and maldevelopment in precisely the societies they

were supposed to be developing. According to the West, modernization required the transfer of (secular) scientific rationality and technical expertise from the West to the underdeveloped societies. With the recession, questions arose about how free of specifically Western, capitalist, expansionist, and neoliberal democratic values were modernization theory, its development projects, and the scientific rationality and technical expertise that they delivered (Escobar 1995; Sachs 1992).

A third source of skepticism was the success of the religious revolution in Iran. According to the dominant secularism narrative, this wasn't supposed to happen. Increasing modernization would spread secularism, decreasing the power of institutionalized religions to shape public policies and governance in nation-states. Yet the Iranian revolution occurred in a society that had earlier embraced a secular state. It did happen, and it turned out to be just the first of an increasing number of such transformations of formerly secular states into ones with official religious commitments. This is paradoxical from the perspective of the classical secularism narrative—though not from the perspective of the director of Human Rights Watch, as indicated earlier.

It is hard to know just what to make of this turn away from separation of church and state in the Middle East. Some might think this just a bump in the road as secularization spreads around the globe. Yet continued analyses of rapidly changing circumstances are leading at least some observers to note that it is not secularization's spread or the inclusion of Islamicists in the new governments which should be the issue. Rather, it is pluralism, inclusivity (diversity!), that is so important to the establishment of democratic social relations. It is dogmatism, whether religious or secular, that advances discrimination against people. Governments have too often adopted either a repressive secularist stance that abhors people's religious commitments and delegitimizes their civic organizations while amassing privilege for itself (as Kenneth Roth noted), or a repressive religious stance that abhors and punishes people's commitments to other religions and to secularism while accumulating economic and political privilege for itself (as radical religious groups of various sects have done). As Marwan Muasher (2014) and Malise Ruthven (2014) argue, it is pluralism that has been so difficult to establish in the state transformations of the Arab Spring. State constitutions must firmly commit themselves to inclusiveness if the usual mechanics of democracy, such as voting, are to advance democratic social relations. However, this is too complex an issue to pursue further here.

From a different perspective, one can wonder if the nation-state isn't itself part of the problem for the secularism narrative. Doesn't its explicit

commitment to an ethnic and frequently religious identity as a distinctive people, as a nation, conflict with the multiculturalism of any democratic state? (“We are American. In [a Christian?] God We Trust.”) How should the relations between secularism and nation-states be understood in the context of achieving democratic, multicultural global social relations (Levey and Modood 2009)?

Co-Constituted with Protestantism Many of the skeptics now hold that the secularism of modern Western states has from its origins been constituted with deeply Christian commitments, and even specifically Protestant ones. Whether explicitly or only implicitly, modern Western secularism and Protestantism co-constituted each other at their origins. After all, Protestantism secularized certain practices of the Roman Catholic Church, turning them over to the laity. Philosopher Shannon Sullivan (2010) points out three features of Western secularism that mark it as distinctively Protestant. One is its conceptualization of religious commitments and experiences as individual, rather than as collective ones of the community. Another is thinking of religious commitments as beliefs or as faiths rather than as daily practices, community ceremonies, and/or rituals. Consequently, third, there is the insistence that religious and spiritual experiences and commitments be assigned to the private sphere rather than to the public sphere. As Janet R. Jakobsen and Ann Pellegrini put the point, in Western public life Protestant commitments tend to disappear into state secularist policy, leaving only Catholicism, Judaism, and all of the rest of the world’s religious commitments visible specifically as religious ones (2008b).

Western Secularism Has Racist Effects Sullivan (2010) has argued that US. philosophy’s secularism has racist consequences for the discipline. “Given that religion and spirituality often are important components of the lives of people of color, a philosophy that is hostile to religion tends to produce a chilly climate for them. That chilly climate helps ensure the ongoing whiteness of philosophy by implicitly discouraging people of color to enter and remain in the academic discipline of philosophy.” As an example of such hostility she quotes philosopher Richard Rorty (2003): “. . . we secularists have come to think that the best society would be one in which political action conducted in the name of religious beliefs is treated as a ladder up which our ancestors climbed, but one that now should be thrown away” (142). Another example Sullivan points to is that feminist philosophers often have stated that religion has no place in a women-friendly and antisexist world. After all,

religious institutions have long exercised severe controls over women's bodies and behaviors in ways their brothers have not had to experience. Western feminism has a long history of criticizing the major religions in the West—Roman Catholicism, Protestantism, and Judaism—as being patriarchal and sexist in their distinctive ways. Sullivan thinks these philosophers who are hostile to religion are distinctive not in dismissing it as a meaningful part of a philosophical worldview, but rather in dismissing it so blatantly (Sullivan 2010, 143). That is, philosophers often implicitly dismiss religious and spiritual commitments as irrelevant to philosophic issues. But they seem to have little concern with the effect their overt, public dismissals will have on those who do have religious and spiritual experiences. They don't worry about being rude or insulting to their colleagues or readers in such comments.

Whether or not blatant, I think this dismissal signifies the still prevalent commitment of logical empiricist philosophy to “scientific” philosophies intended to contrast with what those who make such commitments see as the speculative nature of earlier philosophies, including continental philosophy, and especially nineteenth-century German philosophy. They are concerned to present “proper scientific selves” to their publics (a topic to be pursued in the next chapter). This in turn is part of the self-aggrandizing exceptionalist and triumphalist attitude about modernization, and the role of scientific rationality and technical expertise in creating it, that is assumed by most Western scientists, social scientists, and many other educated people.

Sullivan argues that the issues that are central to the academic field of philosophy of religion—such as questions about God's existence and nature, the problem of evil, reasons for (dis)believing in miracles, the relationship of faith and reason, and the relationship between religion and morality—tend to appear irrelevant to many people of color in the United States. For them, religious and spiritual matters have been linked to their daily experiences in a white supremacist society, rather than to such epistemological and metaphysical issues. Drawing on African American and Latino writers, Sullivan points to the significant role that the Christian tradition and church have played in sustaining African American, Hispanic, and Latino identity in the United States. Such tradition legitimates and frames the histories and everyday experiences of their suffering, as one can find, for example, in the civil rights movement and in liberation theology among Latin Americans. Sullivan notes: “What these accounts demonstrate is that for many Hispanic/Latino and African Americans, religion primarily centers on concrete struggle for social-political justice and personal meaning, not abstract

metaphysical debates about God's existence." Philosopher Charles Mills argues that "the silence about race and racism in most of mainstream Western philosophy implicitly excludes people of color from participating in the field. The message sent by this exclusion is that the lives of people of color do not matter enough even to be acknowledged in philosophic discussion" (1998, 3). Philosopher and theologian Cornel West has persistently raised similar issues (1989, 233; see also Harris 1999).

A critic may charge that in fact African Americans and Latinos are becoming less religious these days. That may well be true, especially in terms of church attendance and strict obedience to principles that the young no longer find as compelling as did their grandparents.⁶ Yet my point here is that their legacies include recent heroic pro-democratic histories that have been nourished by religious institutions and appeals to morality. Moreover, "faith-based" institutions have been stepping in to provide the social services that the US government has recently refused to continue providing at the same time as it protects the state-provided resources of the rich, from tax breaks to corporate privileges.

Collective Way-Seeing versus Supernatural Beings and Private Faiths Sullivan's account recognizes that for the African Americans on whom she focuses, religion and spirituality are linked to their daily experience as they "struggle for social-political justice and personal meaning." Religion and spirituality are about their suffering, their daily survival, their own identity as unjustly treated by white society, and the ennoblement that their struggles for dignity can bring. This set of concerns is central not only to those struggling for social justice in the United States and Latin America, but also more generally to any group with good reason to recognize that it faces challenges far greater than it can overcome on its own. The knowledge that such cultures seek and value has the religious, spiritual, and moral properties of enabling them to survive and of giving meaning to the hardships of their lives.

Philosopher of science Jim Maffie has focused on this feature of Native American thinking and practice, which he identifies as way-seeking. Writing of the place of inquiry about the natural world within such a context, he says:

One cannot evaluate Nahua inquiry by scientific norms, values, and goals without begging the question in favor of the epistemological legitimacy of those norms, values, and goals The Nahua regarded life on earth for human beings as one filled with

pain, sorrow, and suffering. The earth's surface was itself an extremely treacherous place. Its name, *tlalticpac*, literally means on the point or summit of the earth, suggesting a narrow, jagged place surrounded by constant dangers. The Nahua sought practicable answers to what they regarded as the defining question of human essence: How can humans maintain their balance upon the slippery earth? Together, this situation and question constitute the *problematic* which functions as the defining framework for Nahua inquiry (be it epistemological, moral, aesthetic, or prudential) (2003, 71, 75–76; see also Maffie 2014).

A mix of deeply felt religious and spiritual experience and an appreciation for how religious institutions take a leadership role in being on the side of economically and politically vulnerable groups in their life struggles combine to cast in a negative light the typical insistence on secularism in such contexts as the discipline of philosophy and in scientific research.⁷ The secularism of modern Western science and philosophy seems preoccupied with issues that are irrelevant to non-Western cultures' religious and spiritual experiences. Worse, it fails to identify what those experiences are and how they function in daily life. It misreads them through the Christian and Protestant lens of Western secularism, and rejects the adequacy of indigenous knowledge because it is not focused on the kinds of issues important to socially, economically, and politically advantaged modern Westerners committed to a "disenchanted world."

Finally, it fails to recognize the similar collection of Protestant religious and moral values and interests (not to mention the plethora of rituals and ceremonies) that infuse modern Western public life, including its sciences. Consider, for example, historians' accounts of early modern scientists using experimental method to understand God's mind in even greater detail, or attempting to achieve salvation through seeking knowledge. As one historian of science has argued, atomic bomb testing in the last century was recognized in the scientific community as not particularly valuable empirically; rather, its value lay in its dramatic ritual and ceremony, intended to scare off the Soviet Union from imagining it could win a nuclear war (Gusterson 1996; see also Needham 1969, Noble 1995). Ritual and ceremony in knowledge seeking are not absent from the widely acclaimed achievements of contemporary science.

Justifying Colonial Violence Jakobsen and Pellegrini (2000b) point out how this dominant secularism narrative also justifies colonial violence. As indicated, other cultures often openly resist what they perceive to be

the Christian characteristics of the West's secularism. Many Westerners, too, have perceived such resistance in moral and religious terms. Those who resist secularism are perceived as threats to the moral (Christian) commitments of Western modernity and its related goal of social progress, not simply to its intellectual commitments. Non-Christians have often been perceived not just as ignorant, but as evil in their worship of idols and false gods. For their own good, as well as to protect Christians from their evil intentions, they must be convinced of the superiority of Western ways of thinking and living. Those who resist are perceived to be against the kinds of community practices and moral goals through which peoples of European descent define themselves and their superiority (Sands 2008). Violence against such resisters has been justified by the moral and rational rightness of Western defenses of our unique civilization, according to such views.

Multiple Secularisms Finally, since religions are multiple, then just what secularism consists in will vary from one religious context to another. This is to say that in different religious contexts, different forms of secularism emerge. To put this point another way, secularism is always conceptualized *within* religious understandings of the world (Calhoun et al. 2007; Jakobsen and Pellegrini 2008; Levey and Modood 2009). The moment that a religion specifies what counts as its necessary practices, it also specifies what will count as being nonobservant—as that particular religion's secularism. The typical contrast between religion and secularism is only half accurate. This perspective on secularisms is reinforced by recognizing that many Western scholars have argued that modernities, rationalities, and sciences should be conceptualized as plural (a topic addressed in chapter 5.) Multiple secularisms are yet another dimension of how sciences and their societies co-constitute and coproduce each other.⁸

In this section we have seen the emergence of a variety of skeptical questions about the Western secularist stance. This chapter began by focusing on the tendency of scientists and philosophers in the West to regard indigenous knowledge systems as lacking objectivity because their knowledge seeking so often was embedded in religious and spiritual experiences and commitments. Yet the field of science studies has developed understandings of modern Western sciences that would seem, mostly unintentionally, to support claims that indigenous knowledge is not different in kind, at least in the specified ways, from modern Western sciences. There are several new ways of understanding Western sciences in which we can see this alignment.

Science Studies Aligns with New Perspectives on Secularism

As noted in chapters 1 and 2, recently science studies explorations of how (and how not) to depart from positivism have produced analyses that align with the new challenges to conventional philosophies of science. They align also with a refusal to see religious or spiritual features of scientific research as in themselves disqualifying such projects from producing reliable results of research.⁹ And they align with new understandings of how Western secularisms are always embedded in particular religious and spiritual legacies.

Earlier Identified Alignments Occasionally historians of science directly address how religious or spiritual commitments have shaped the very best Western research (e.g., Jacob 1988; Marks 2007; Noble 1992, 1995; Yates 1969). But this is rare. Nevertheless, there are a number of ways in which the science studies insights are aligned with the criticisms of the secularism/religion binary discussed here. In chapters 2 and 5 we discussed five of these. One was that objectivity has a history; it has not been a fixed and static concept, nor have its meanings and references been constant in different social, cultural, or political environments. Rather, it has been transformed again and again in response to distinctive historical events and processes. Here we can note that these historical events and processes include secular and religious-spiritual elements. Thus, secondly, secular and religious-spiritual aspects of culture are part of what co-produce and co-constitute sciences, as the latter in turn have effects on those secular and religious-spiritual experiences and institutions.¹⁰ Sciences and their societies, including secular and religious-spiritual elements, co-produce and co-constitute each other.

Third, chapter 2 discussed the multiplicity of valuable scientific and technological expertises. Different secularisms, related to their distinctive religious and spiritual legacies, also encourage different ways of practicing knowledge seeking. Chapters 2 and 5 discussed a fourth feature of science noted by science studies: the importance of scientific intervention in nature's order rather than continuing to favor philosophers' overvaluation of theoretical representations of that order. Culturally diverse secularisms and their related religious and spiritual legacies have directed different kinds of practices of intervention in nature's order, or resistances to them. "Knowing how" is as important for the success of knowledge-production processes as is "knowing that," as philosophers put the point.

Finally, as we saw in chapter 5, philosophers and historians have been arguing for the disunity of modern Western sciences (Galison and Stump 1996), the disorder of nature (Dupre 1993), and for recognition of the pluralism within modern Western sciences (Kellert et al. 2006). Since this disunity and pluralism is both a fact and also often desirable, as these authors argue, it would seem that the multiplicity of kinds of religious-spiritual experiences and commitments and their related multiple forms of secularism make their own contributions to the valuable multiplicity of the ways of producing knowledge about the world. So here are five distinctive ways in which the alignments of science studies insights with repositionings of what maximizing objectivity should mean today align also with the new ways of thinking about the binary of secularism versus religion and spirituality.

More Alignments: Modernity and Tradition Always Hybrid The contrast between modernity and tradition invoked by modern Western disvaluations of indigenous knowledge has come under criticism from several perspectives. From a postmodern perspective, scholars have given us historicizations of many of the supposedly universally valid bedrock assumptions that are said to indicate the distinctive character of modern Western sciences, such as objectivity, rationality, scientific method, and the glassy-mirror mind of the observer, in Richard Rorty's (1979) phrase. These historical accounts reveal the cultural specificity and thus the parochiality of claims for their universality. Meanwhile, postcolonial critics have interrogated the reliability of any accounts of what constitutes the traditions of a culture, and thus provide a critique of the modernity-versus-tradition contrast from another angle. Moreover, the analyses of multiple modernities have documented how different cultures have developed their own distinctive forms of modernity that fit with their particular cultural legacies and current needs. What counts as tradition and as modernity is continually contested, negotiated, rearticulated and adapted to new circumstances (Eisenstadt 2000). Thus, in many contexts modernity is not usefully contrasted with tradition any more than secularism is with religious and spiritual commitments. Since the arrival of modernities, more and more societies have become hybrid ones containing elements both of their own traditions and of the modernity they have received and/or adopted. These analyses open up conceptual space for recognizing culturally different sciences as part of those culturally distinctive modernities. Accounts of the empirical reliability of indigenous knowledge and of its hybridization with elements

of modern Western sciences seem much more plausible in the context of these critical analyses of the modernity-versus-tradition binary (Gupta 1998).¹¹

Modern Western Epistemologies Always Also Moral Positions Finally, historians Lorraine Daston and Peter Galison (2007) have argued that epistemology always begins, as they put the point, in fear that one's knowledge claims are not adequate.¹² They show how standards for what they call "right sight" in the sciences have shifted with the introduction of new technologies of observing and representing nature. They focus on such an example as the camera, which was regarded as being superior to earlier drawings and engravings of natural objects because it was thought to eliminate all human elements from the process of representing nature.¹³

Here the focus is on Daston and Galison's argument that that scientists' senses of themselves as being engaged in the highest moral pursuits are repeatedly challenged with each new objectivity practice. So, too, is the reputation of their work as honorable. Thus challenges to the "right sight" of scientific practices are perceived as challenges to the moral integrity of the scientist and his profession. The scientific and epistemological goal of maximizing objectivity is always also a moral and political project. Writing about the increasing challenges from the new social justice movements to the objectivity of conventional historical research in the 1960s, Peter Novick had put this point the following way:

But the objectivity question is far from being "merely" a philosophical question. It is an enormously charged emotional issue: one in which the stakes are very high, much higher than in any disputes over substantive interpretations. For many, what has been at issue is nothing less than the meaning of the venture to which they have devoted their lives, and thus, to a very considerable extent, the meaning of their own lives (1988, 11).

We saw in chapter 5 the tumultuous social and political conditions under which the prevailing logical empiricist notion of objectivity was formed and reformed in response to political forces of the day. Support for this position can be found also in Jasanoff's (2005) analysis of the necessity of differing strategies for achieving objectivity in the evaluation of biotechnologies in the different national moral and political climates of Germany, England, the European Union and the United States. This insight about how modern epistemologies are always tied to moral and/

or political stances enables us better to understand why it has proven so difficult for so many people educated in Northern philosophies of science to give up even the most problematic features of positivism in spite of what would be counted in less emotion-laden cases as compelling evidence against them.

My point here is that this science studies discussion of the moral dimensions of epistemology aligns with claims that religious and spiritual elements of knowledge seeking do not necessarily damage the accuracy or reliability of the results of that research. Science studies is clear that cultural commitments, such as religious, spiritual, and moral ones, can advance the growth of knowledge. Of course this does not mean that they always do, but only that the fact of cultural commitments should not in itself be permitted to serve as a good reason to disvalue the reliability of a knowledge-seeking project or its results. The historicization of the concept of objectivity in that science studies literature reveals how often the most highly admired scientific and epistemological projects in the Global North have been invested with moral dimensions.

There is one more literature in recent science and technology studies that contributes to the more skeptical evaluations of secularism. That is feminist work.

Feminism and Secularism

“The woman question” has always been deeply entangled with the secularism-versus-religion binary. This is so because women so regularly are positioned differently from their brothers with respect to religion. Women and their behaviors are usually expected to exhibit the religious and moral commitments of their cultures in ways that their brothers and their behaviors need not. Both in the West and in other cultures, women are positioned as more deeply embedded in their cultures than are their brothers. Women’s clothes and deportment in public, childbearing and domestic responsibilities, and their centrality to issues of desirable sexuality, family relations, and consequently to senses of cultural tradition all make women less able than their brothers to achieve the enculturation of cosmopolitan citizens of the world, so to speak. This is so in the eyes of their own societies as well as in those of secularists. Yet women’s relations to secularism and religion are more complex than these observations might suggest.

On the one hand, patriarchal religions have rightly been blamed for justifying and enforcing women’s subjugation, often in hideous ways—from witch hunts, widow burning, and honor killings to brutal control

of women's marriage and reproductive practices. On the other hand, secularism certainly has not proven a consistent antidote to the patriarchal control that women have sought to escape. Within nation-states in the Global North that are explicitly grounded in Enlightenment secular principles, it has taken huge political struggles to advance formal equity for women. Today, in many respects women still lack social and economic equity with their brothers. The sex trade and violence against women are still tolerated in many places in the Global North even where they are technically illegal. In the Global North, newspapers are still full of accounts of the rapes, murders, enforced sex work, abduction, slavery, abandonment, abuse, and other kinds of hideous treatment of women and children. To too many men, it has remained acceptable for male workers—at every economic and social level—to displace onto women and children their legitimate rage at the miserable conditions that so many of them must bear. Family and domestic relations are one (but not the only) context in which men correctly sense that they can get away with expressing rage in ways that should be regarded as immoral and often criminal. Moreover, it is only recently in the United States that beating one's wife became illegal, and that marital and date rape became comprehensible legal concepts at all.

It is also the case, however, that women have developed distinctive ways of using their religious experiences and identities to transform their own social and political statuses and their religions. Thus, religious identities have provided useful sites in which women have been able to empower themselves and to transform dominant religious institutions (Sands 2008). This has been so from earlier women's participation and often leadership in the northern European Protestant reform movements in the seventeenth and eighteenth centuries to the recent religion-based feminisms developed since the 1970s within so many cultures around the globe. Islamic feminism today, for example, is the site of emerging radical transformations both of women's status and of institutions of Islam itself (Gole 2000; Hafez 2011; Mahmood 2001). Thus secularists, including feminists, need to grasp the multiplicity of feminisms, religious identities, and secularisms that have been developed in different cultural contexts, and to understand the contributions made to multicultural democratic social relations by such reworkings of religious identities. In such contexts these religious women should be seen as agents of progressive social transformation, according to many observers.

Another issue is that feminist secularism in the Global North has again and again had the effect—and sometimes the intention—of advancing racism and colonialism.¹⁴ These issues are not solely matters of

history. A number of late-twentieth-century US feminists have joined other secularists to create such effects in academic philosophy, as philosopher Shannon Sullivan argues (Sullivan 2010). This can occur entirely unintentionally, as one can see by noting that these very writings sometimes also develop powerful antiracist arguments. Yet insofar as feminists in the Global North unreflectively align their philosophies and social studies of science with the distinctively secularist stance characteristic of educated Northerners and their philosophies, they, too, advance continuing colonial and racist understandings, attitudes, and practices toward their own racial subgroups as well as toward peoples in the Global South.

In recent years such alignments have been especially visible when feminists in the Global North have sought to improve conditions for women in the Global South by criticizing the religiously or culturally sanctioned treatment of women in ways that the North regards as violations of human rights. For example, they have criticized female genital mutilation, widow burning, honor killings, the seclusion of women in households, and the refusal to let girls and women attain literacy. Yet such Northern feminist practices provide evidence for Southern critics of Northern expansion that such feminist projects are Northern cultural and political imports, and are thus continuations of colonial and imperial relations. Such charges are made even when local feminist groups in the Global South have undertaken such projects. These local women are influenced by one more Northern export, the argument goes: feminism. Thereby, they betray their local culture's resistance to ever-expanding Northern culture and politics. That I say this here is not to approve of the female genital mutilation, widow burning, honor killings, or other practices that are dangerous or disempowering to women's life and health. Rather, it is to recognize the reality of how difficult it is to keep the politics of feminism excluded from perceptions in the Global South of continued Northern colonialism. Nobody in the Global North gets to be "innocent" of participation in current global politics and its historical legacies. And "doing nothing" doesn't make one "innocent" either!

Thus, feminist analyses have shown how feminist secularists have been as unaware as their brothers of how their secularism has had damaging effects on Southern peoples and their knowledge systems. And they have been equally unaware of or unable to understand the complex uses of their religious identities that women have made on behalf of improving their own social status, and on behalf of progressive transformations of their religious traditions. When thinking about religions and

secularizing, it is always valuable to examine how issues about women and gender are entangled with them.

Creationism and Intelligent Design

One cannot leave an analysis such as this one without returning to the issue of the surprising return of religion to the public sphere, which is so troubling to many in the West today, and in other cultures. Before returning to this controversial issue, however, it must be emphasized that nothing said above should be taken as an affirmation that it is OK for religious groups to commit illegal and or violent acts against nonbelievers. Moreover, nothing said above affirms that it is OK for a religious group to demand an unfair share of privilege in any public sphere context, including that of scientific research. This has been a problem in the United States recently, as noted earlier, as various Protestant fundamentalists have demanded that the US government identify itself as actively promoting Christian and Protestant commitments in a variety of ways, thereby rejecting the constitutional principles that the state favor no particular religion. And, as I have been arguing, it is a problem more generally that Western secularist standards of “good science” automatically reject as myth, magic, and superstition knowledge systems that are grounded in non-Western religious and spiritual commitments. All that said, of course scientific research often raises moral and political issues; this is certainly not new. The position here is that these issues require public debate with full participation of all stakeholders. (We return to some of these issues in chapter 7.)

Some Protestants in the United States have demanded that creationism and intelligent design be recognized as sciences that are at least intellectually equal to evolutionary theory. If we are to recognize indigenous knowledge systems fully as sciences, including ones embedded in religious and spiritual commitments, shouldn't we also recognize creationism and intelligent design as fully scientific? This is a complex and emotionally fraught issue; it would be unrealistic to expect that any particular way of thinking about these issues will be found compelling to all readers.

That said, in this case it seems to me wrong to demand that such believers deny their Protestant faith in creationism and intelligent design. Yet it seems legitimate to, for example, require students applying for university admission to evidence satisfactory grades in a high school evolutionary biology course, whatever other courses they may have also taken, as a California judge ruled several years ago. Understanding ge-

netics, which is grounded in assumptions of evolutionary biology, is crucial for addressing a wide array of biological, agricultural, and medical issues. So here I suggest that it is important not to “take sides” with respect to which faiths other people may be “allowed” to find reasonable, regardless of how irrational we think it is to hold them.¹⁵ But it is appropriate to require certain kinds of scientific training for specified educational or other legitimate purposes. We can respect people’s right to their own beliefs and practices, within the usual limits of not harming others, without agreeing with them about the desirability of those beliefs and practices. We can agree to disagree about the ontological issues and their right to constitute their own conceptions of reality.¹⁶ Yet a critic might say,

But if secularism is a moral/political/religious commitment that should not be privileged over others, then it deprives us of resources for saying, for example, that it is more important to make sure students learn evolutionary theory as opposed to creation theories. Why is it that students should be held accountable and have to pass certain tests on biology and not creationism? We need some basis for saying why some things should be taught over others.¹⁷

Yes, we do. It can be extremely troubling for scientists and philosophers of science to notice that the field of science studies has undermined the kinds of rock-hard “facts” the scientists and philosophers needed to justify support for funding for standard biology classes, or resistance to requiring classes in creationism in public schools. It is most irritating to have to defeat arguments that scientific theories are “just theories,” as is contended by creationism or intelligent design (but see Marks 2007). I’m suggesting, in line with the California judge, that it is possible to make such arguments compelling on grounds other than the reality of religious or scientific phenomena or the certainty of the truth of either religious or scientific claims.¹⁸

Let me put the issue another way: My point here is to refuse to “take sides” with respect to the truth of people’s favored creation narratives. Everyone should be permitted to follow their own inclinations on such issues (with appropriate caveats about hate speech and harming others). However, if some particular kind of scientific research is thought to require acting in the laboratory “as if” evolutionary theory were true, then people who intend to become that kind of scientist, or citizens who are expected to vote on related scientific issues, will need to understand why

and how that kind of science is valued. A training in creationism or intelligent design is not helpful for genetics research, or for making decisions about how to use it. Such positions may be helpful as legal strategies, as Jonathan Marks has put the point about intelligent design, but no evidence has been provided that such beliefs can direct scientific research projects that answer the kinds of questions addressed, for example, by genetics in ways that permit desired biological, agriculture, or medical interventions.

Defenders of evolutionary biology may think this too generous an attitude toward the defenders of creationism and intelligent design. It is necessary to commit ourselves to the reality, the hard facts, of the world that evolutionary biology describes and explains. Scientific realism should be the only permissible position, they may say. However, in chapter 4 we saw the value for the Pacific Island navigators of learning techniques of dead reckoning to which Western conceptions of ontological reality would have been irrelevant at best. In the similar example I proposed, in traveling from New York to Boston, it doesn't matter whether Albany actually traveled past us from the north to the west if our goal was simply to chart an accurate path to Boston. It didn't matter if the geese actually intentionally communicated with the Cree hunters if the hunters' goal was to figure out how to maintain an environment that could sustain a supply of geese. And theoretical entities are often valued by Western scientists for similar reasons. New planets are "imagined" before they can be observed. And recently one (Pluto) went out of existence as a planet. It is still not clear what genes "are" (Keller 2009), yet the assumption that they function in specific ways has proven fruitful for generating new observations and new research projects. Retroviruses and tectonic plates were "discovered," or perhaps we should say invented, to explain puzzling phenomena. The position recommended here with regard to reality claims many people think pernicious is little different from those positions with which we are at least moderately comfortable in the case of practices of the natural sciences. Insisting on an indefensible and unnecessary scientific realism is often more trouble than it is worth.

Secularism: A Culturally Specific Influence on Western Science

I have been arguing that the Western exceptionalist and triumphalist secularist stance needs rethinking if we are to arrive at a philosophy of science with more desirable intellectual and political consequences. For a number of reasons, it should no longer seem appropriate to refuse to

countenance indigenous knowledge as reliable and objective solely on the grounds that it is embedded in religious and spiritual experiences and commitments (when that is the case). Moreover, it seems clear that Western multicultural democracies find it especially difficult to extend their highly valued tolerance for cultural difference to the increased presence of Muslims and Islam in the West. Such observations provide good reasons to rethink what the West means by secularism and by multicultural secular democracies. They provide good reasons to adopt more supportive policies toward other societies' local knowledge systems. Here they can draw support from many arguments in recent social studies of science and technology. And they add to the many voices that have called for abandoning the exceptionalist and triumphalist stance of Western societies toward our own histories of scientific rationality and technical expertise.

Moreover, because women tend to be positioned differently than their brothers in relation to their cultures' religious and moral principles, they have sometimes been able to use such positions not only to improve their own conditions, but also to transform their religions. This is just one of the many ways in which women have been significant agents of progressive social transformation. Thus, gender must always be considered a possibly relevant factor in thinking about religion and secularism.

For the field of science studies, another conclusion here is that secularism, no less than overt religious and spiritual commitments, is a culturally specific historical force on the shape of modern Western sciences, as it is for the sciences of other cultures. It never is the mark of the absence of such cultural commitments that has been assumed.

7

After Mr. Nowhere: New Proper Scientific Selves

The opening chapter briefly identified six arguments in defense of the claim that the sociopolitical commitment to certain kinds of diversity and the epistemic-scientific commitment to objectivity need not conflict with each other. Rather, often they can provide support for each other. This is the “mutual support claim.” This chapter begins with a summary of these arguments as they were developed through the preceding chapters, in order to set the stage for a final issue: What are the new “scientific selves” required by this kind of research? Who are the desirable and legitimate subjects or agents of knowledge produced in this manner?

This question becomes significant because we can no longer get away with assuming that researchers can or should try to provide “the view from nowhere.” Knowledge is always socially situated, as standpoint epistemology argues, and some social situations are better than others for producing the kinds of knowledge that are needed by particular social groups. Yet we can still aim for objectivity in research—indeed, for even stronger standards for maximizing objectivity than the value-free stance required. But what does the agent, the subject, of such knowledge projects look like after the demise of “Mr. Nowhere?” That is the topic for this closing chapter.

First, we turn to summarizing the six arguments for the “mutual support claim.”

The Mutual Support Claim: Social and Epistemic Norms Can Support Each Other

Strong Objectivity’s Logic First, the *logic* of standpoint theory and its strong objectivity program, discussed in chapter 2, makes clear that homogenous communities of researchers lack the resources to detect many of the community-wide values and interests that shape their own assumptions, policies, and practices.¹ The lack of such resources tends to produce ignorance about aspects of nature and social relations in which researchers and/or their sponsors and funders are not interested, and distortions of reality in cases where they do have interests. Yet even when such communities can’t detect how, for example, militaristic or corporate values are directing their research, their research produces guns that shoot accurately and seeds that tend to produce the crops intended. So it must be a mistake to assume that research shaped by social values and interests invariably will be empirically unreliable.

To be sure, it is obvious that some values and interests do indeed damage the comprehensiveness and reliability of the results of research. Yet it is clear that others do not. So an important new focus of interest is to ponder how it is that some social values and interests advance the growth of knowledge. It seems not only that maximal objectivity and a commitment to a more democratic organization of research processes need not conflict, but that they can often enhance each other. Moreover, the concept of strong objectivity does capture “real objectivity” in a crucial sense. While it abandons the requirement that maximally objective research must be value-free, it requires that research be fair to all existing evidence and to its severest critics. And this fairness doctrine was always the foundation of the original requirement for value-freedom. Thus, the strong objectivity project counters the fatal limitations of the value-free doctrine for maximizing objectivity.

Global Implications: New Facts about Women, Gender, and Development Second, these issues are not simply about what happens in Western sites of research. They have global implications. One discussion of this appeared in chapter 3. There the focus was on a number of ways in which development policies and practices in the Global South have further impoverished poor women (and men). Development policies were guided by the form of modernization theory that emerged in international

agencies after World War II. The transfer of Western scientific rationality and technical expertise from the West to “the rest” had always been the “motor” of modernization theory and now drove development policy. Research directed by feminist and postcolonial values and interests revealed that many of the assumptions about women and poor people in the Global South that had guided development policy in the World Bank and other institutions controlled by the Global North turned out to be false. This was discovered by starting off thought about development policies and practices from the daily lives of poor women (and peasants) in the Global South. The strong objectivity approach enabled the goals of improving the living conditions for poor women and of decreasing poverty overall to be advanced in ways that the older policies and practices could not achieve. This argument extends the import of standpoint methodology and its strong objectivity project into issues centered in postcolonial science and technology studies. And it reveals their usefulness in social as well as natural science research.

Is Indigenous Knowledge Reliable? Do We Live in a World of Sciences? A third argument focused on another issue in postcolonial science and technology studies: the reliability of indigenous knowledge systems even though they are always embedded in culturally local assumptions and interests. Because they are so embedded, modern Western scientists have regarded indigenous knowledge as unreliable, as not “real science.” Yet in order to survive and flourish, sometimes for millennia, societies around the globe have had to develop reliable knowledge of the world around them. Botany, agriculture, animal husbandry, medicine, pharmacology, navigation, manufacturing, and engineering are among the fields in which non-Western societies have developed systematic knowledge through empirical trial and error and constant revisions in their assumptions and practices as they encountered changing environments and changing social conditions.

Modern Western sciences have had a peculiar relation to these knowledge systems. On the one hand, as indicated, the latter are usually dismissed as not really scientific, precisely because they are so embedded in cultural values and interests. They include practices, such as rituals and religious appeals, that are overtly forbidden in modern Western sciences. On the other hand, again and again modern Western sciences have appropriated pieces of these knowledge systems, usually without acknowledgment. The colonial botany dating back to the eighteenth century provides one range of examples here. “Economic botany” was the “big science” of its day, and many of its raw materials came from

plants already found to be useful and even cultivated in the Americas, Africa, Asia, and wherever European imperialism and colonialism encountered them and their indigenous users. This “primitive epistemic accumulation,” as sociologist David Hess (2011) refers to it, was crucial to the great successes of Western biology. Here, then, is another area of the production of scientific knowledge in which reliability of the results of research seems not to be damaged by local cultural values and interests. Of course no knowledge system is perfect. While indigenous systems clearly have been highly successful in enabling effective interactions with their local natural and social worlds, they have their limitations, as does every knowledge system. Nevertheless, a number of postcolonial critics have shown that in important respects, such as their contributions to the maintenance of biodiversity, they should be models for sustainable futures.

These accounts also produce the perhaps surprising insight that there should not and cannot be only one science around the globe. Rather, economic, political, social, and cultural differences between societies insure that each will develop distinctive bodies of knowledge that, they hope, best enable them to flourish in the particular parts of the natural and social world that they occupy. Apparently such differences between scientific traditions extend into their ontologies and epistemologies. We do, and in principle must, live in a “world of sciences.” The next argument brings such a conclusion into conflict with an otherwise illuminating recent philosophy of science analysis.

Value-Free Science Was a Political Choice! Fourth, it turns out that it is not just other cultures’ sciences that have been transformed in response to new social and natural environments. So, too, has been the mainstream Western philosophy of science. New histories of the philosophy of science have recently appeared, as we saw in chapter 5. These chart the origins of what subsequently became logical empiricism (or logical positivism) in the mostly socialist Vienna Circle before World War II. These scientist-philosophers believed that scientific research in itself advanced democratic social relations, and that “scientific research” should be considered to be another name for “democratic research.” They wanted to harmonize (“unify”) the projects of the sciences of their day to produce kinds of information that could counter racist uses of eugenics to justify fascist policies and practices, and that could guide progressive responses to the prevailing social problems. Freedom from fascist and antisemitic values was the social interest that directed their projects. There was no tension for them in the *value* of putting value-free scientific research

in the service of solving pressing social problems that otherwise were being solved in hideous ways by fascists. (Nor would many philosophers and scientists today find anything odd in such assumptions.) Soon these scientist-philosophers, many of whom were Jewish, began to emigrate from Germany and Austria mostly to the United States. But here they and their philosophy of science encountered the anticommunism and antisemitism of McCarthyism and the Cold War. Their philosophy had to be radically reshaped. They scaled back its concerns to those that could be regarded as value-free by such political forces, as some of them—namely Reichenbach and Carnap—earlier had intended their work to be. Thus the historian George Reisch provides an extended account of *How the Cold War Transformed Philosophy of Science: To the Icy Slopes of Logic*.

So was this supposedly value-free “scientific” philosophy politically committed or not? After half a century of science studies, it seems more reasonable to see it as having been twice shaped by resistance to the politics it encountered: first fascism and antisemitism, and then McCarthyism and the Cold War. Its insistence that the objectivity of science depends on the value-freedom of its methods and results of research was itself simultaneously a commitment to a philosophy of science free of fascist and Cold War politics, and a specific political response to political threats against its adherents. To our eyes today, the association of objectivity with value-freedom is not itself value-free! It has been in each moment a politically motivated stance. The insistence on the value-freedom of objectivity now seems a contorted philosophical position which it is no longer necessary to hold. It turns out that we in the West, too, live in a world of sciences that have been shaped by different values and interests in different historical circumstances.

Yet recognition of this history helps to explain the deeply felt resistance of so many US intellectuals to contemporary attempts to jettison the value-freedom requirement for maximizing objectivity. To give up this requirement is to abandon the very strategy that our professors in the 1960s and 1970s had championed in order to save scientific and philosophic work from the radically antidemocratic forces of McCarthyism. Upholding value-free standards for objectivity is not just a cool, intellectual, epistemic issue. It is also a deep moral and political issue reflecting on the character of philosophers and scientists and on the progressiveness of their life work. It defines the epistemic and political commitments of a highly admired form of the “scientific self.” This history sets the stage for the deep resistance so many of today’s philosophers and scientists tend to exhibit toward the new forms of a

“proper scientific self” emerging from the antiauthoritarian social justice movements.²

Must Sciences Be Secular? A fifth argument considered the related issue of the claimed secularism of modern Western societies and their sciences. It pointed out that in many contexts, the binary of science versus religion is not really helpful. For one thing, secularisms are plural, and always are constituted *within* particular sets of religious and spiritual beliefs and practices. Being a nonobservant Jew is different from being a nonobservant Catholic or Muslim. Thus, modern Western secularism turns out to be distinctively Christian, and even Protestant in several respects. The secularism of modern Western science is a Protestant kind of secularism. Historians of science have long pointed out particular aspects of the religious features of modern Western sciences. Moreover, they have argued that in fact the Christian beliefs of early modern scientists often inspired and directed scientists of the day to the kinds of achievements for which they are rightly honored. So examples can be found in modern Western sciences of how even spiritual and religious experiences, beliefs, and interests need not damage the reliability of scientific research results. In fact, the historians argue, they can have positive effects on such work.³

Finally, this argument reveals how secularism has been a distinctive *cultural* force in the history of modern Western sciences, rather than a term referring to the absence of culture, as it is usually understood. There has been relatively little attention to this way of conceptualizing the issue in the field of science studies.

Alignments with Science Studies Finally, this mutual support claim aligns well with the most influential insights of the now half-century-old scholarly field of social studies of science and technology, as discussed in chapter 2. Thomas S. Kuhn drew attention to how great achievements in the history of modern Western sciences had “an integrity” with their particular historic eras. Scientists found interesting those issues that were “in the air” in their particular social worlds. The Marxist historian of science Boris Hessen (1971) had earlier argued that Newton’s curiosity aligned with his society’s new interests in better land and sea travel, more currency for market exchanges, more effective armaments, and other practical issues of that time and place. It was not that Newton set out to solve such socially interesting challenges. Rather, he was a man of his time and found interesting scientific issues that aligned with what were the intrusive economic, political, and social interests of his

day. The social studies of science and technology now put this argument this way: Sciences and their societies co-produce and co-constitute each other. Yet it is important to recollect that this co-production thesis was clear earlier to antiracist, anticlass, and feminist social movements. A racist society will develop racist scientific projects, which in turn further support racist social policies and practices, and so forth. This mutual support claim of science and technology studies was already “in the air” as the antiauthoritarian social movements of the 1960s began to form! In this and other ways, the mutual support claim can find evidence in widely supported science studies insights.⁴

So these are the arguments for the mutual support claim that have been developed in earlier chapters. What kind of “scientific self” is called for and created through the progressive science and philosophy projects proposed, or at least glimpsed, in the chapters preceding this one? Or, as historians Lorraine Daston and Peter Galison put the point, how is the history of objectivity the history also of the proper scientific self?

The History of Objectivity as Also the History of the Self

What is the nature of objectivity? First, and foremost, objectivity is the suppression of some aspect of the self, the countering of subjectivity. Objectivity and subjectivity define each other, like left and right or up and down. One cannot be understood, even conceived, without the other. If objectivity was summoned into existence to negate subjectivity, then the emergence of objectivity must tally with the emergence of a certain kind of willful self, one perceived as endangering scientific knowledge. The history of objectivity becomes, *ipso facto*, part of the history of the self. Or, more precisely, of the scientific self. (Daston and Galison 36–37)

Daston and Galison have shown how the conception of objectivity has had a distinctive history, shifting as scientists developed new technologies of observation—of “right sight.” Their focus on the relation of objectivity to subjectivity draws attention to otherwise unanalyzed ethical dimensions of scientific practice and of the classical modern “proper scientific self.” As we all learned, this self is to be capable of transcending any particular local or material “address.” It has a powerful ethical obligation to strive to see everywhere in the universe from no particular location in that universe. Producing this “view from nowhere” has famously been characterized by Donna Haraway (1988) as the “God

Trick.” This chapter uses Daston and Galison’s insight to identify kinds of new proper scientific selves that have already been emerging in social justice research.

This project is important for philosophers of science and scientists especially, since conventional assumptions about the subject or agent of research tend to persist in serving as a measure of what to them is the inadequacy of the epistemologies and philosophies of science promoted by social justice movements.⁵ “Mr. Nowhere” certainly does not represent a social justice movement; research motivated by such movements usually does not speak in the voice of Mr. Nowhere.⁶ Thus the focus on the social justice “selves” is an important missing element of the ongoing attempts of philosophers and methodologists in the natural and social sciences to figure out how to depart from logical empiricism (logical positivism) and its particular part of the liberal political legacy without throwing out the baby with the bathwater, so to speak.

After a few brief comments in the next section on the long history of criticisms of the Enlightenment notion of the self, this chapter will explore a bit further the relevance of Daston and Galison’s observation to the practices of the social justice movements. It will then identify distinctive kinds of proper scientific selves that have been emerging from recent social justice research. Each contrasts strongly with the familiar “Mr. Nowhere,” who can see everywhere in the universe from no place at all.

The Modern Self and Its Discontents: Whose Utilitarian Values Should Guide the Production of Knowledge? Of course the Enlightenment’s disengaged, autonomous, rational subject of knowledge and of history has been under attack since the nineteenth century, and with renewed energy in the last few decades. Nietzsche, Kierkegaard, Weber, and Marx are influential nineteenth-century sources of this skeptical attitude (Flax 1986; Taylor 1989).

Charles Taylor traces the problems with this kind of subject back to a conflict between the political location of the authority of everyday life at the origins of Western modernity and its location today. At the origins, everyday life occurred in the “enchanted world” of Roman Catholicism. A form of reason that was disengaged from that world was necessary to support the materialism of that world as modernity would describe it. It is the control of the knowledge-seeking self through distinctive research processes that maximizes such disengagement and thus produces a distinctive form of rationality. But the disengagement of this reason from everyday social experiences at the origin of modernity is

in tension with today's feminist and class-based moral positions that insist on the affirmation of ordinary life, exemplified by the activities of the family and of economic production respectively, Taylor argues (23, 478). So it is a problem for the feminist and class-based critics (as well as for other groups) who claim the authority of the everyday that the utilitarian values that characterize ordinary life today are themselves already entrenched in commercial, capitalist, and bureaucratic institutions (ibid., 500). Attempts to advance democracy and equality in research in the new antiauthoritarian social movements tend to be justified in terms of procedural fairness. Yet the focus on procedures in natural and social science methods turns issues about democracy and inequality into technical issues. It obscures or even denies the importance of addressing issues concerning the social and political goals of research. Thus, Taylor argues, such procedural preoccupations strengthen the very world they intend to challenge (ibid., 508). To put the point in terms used in earlier chapters, standpoint methodology's insistence on research procedures that "start off" from the daily life of oppressed groups themselves reinstate the instrumental effectiveness of scientific processes that distance themselves from considering the goals or ultimate "goods" of research. Or so Taylor might have argued.

But we can ask whether Taylor is right that a focus on scientific procedures *must* have such self-defeating consequences for the social justice movements. Though he approvingly cites feminist critiques of the modern self (though only on the next-to-last page of his book),⁷ he does not recognize or engage with the feminist moral goals or "goods" that have produced this criticism and gone on to design such value-rich research processes in the first place. It was precisely the goals of standard research—namely, the production of a supposedly "value-neutral" account that could be acceptable to everyone, male supremacists and white supremacists as well as their victims—that feminists challenged. The social justice projects intended to produce the kinds of information and understandings of nature and social relations that politically vulnerable groups needed in order to interact effectively with their natural and social environments on behalf of their own survival and flourishing. The values of these groups in everyday life work against commercialism, capitalism, and bureaucracy. Doesn't the shift from the "view from nowhere" to the socially located oppressed observer avoid the conflict Taylor identifies? Doesn't it "start off" from the different goals of research for economically and politically vulnerable groups? Doesn't it insist on putting "utilitarian projects" in the hands of those who have suffered from the entrenchment of social inequalities in dominant in-

stitutions such as commercialism, capitalism, and bureaucracy? Is the dominant Western modernity the only possible modernity? Or, as some critics might put the point, why should we suppose that the *human* modernization project has exhausted its possibilities with the achievement of capitalist commercialism and bureaucracies?

Postmodern and Feminist Subjects Many feminists had been resistant to the call of the postmodern philosophers to give up assumptions of a disengaged, rational, and autonomous unified subject of knowledge and history. They asked how women could give up a kind of agency to which they had never been permitted access. Women were claimed to be too attached to their kinship identities and responsibilities to be capable of the independence of mind necessary for disengaged objectivity. Their emotionality and irrationality had always been contrasted with models of masculine control of the emotions that enabled a certain sort of rationality. And they never seemed able to achieve the autonomy from relations with kin, and especially with men, to stand as socially independent equals to their brothers. In short, modernity seemed to have bypassed women. Feminists had a different account of this phenomenon. Women had not been “left out” or “bypassed.” Rather, modernity had again and again been defined against whatever counted as the feminine or the womanly (Felski 1995; Harding 2008; Jardine 1985; Scott 1995). Moreover, it seemed suspect that just as the women’s movements of the 1970s were enabling women to begin to claim powerful subject positions in public life and in their research disciplines, the “death” of such positions was being celebrated. Evidently, if elite men couldn’t have rational agency, they pointed out, no one could (Flax 1986; Hekman 1991)!

Thus, feminist theory had produced a different account of the “crisis of modernity” and of “Western epistemology” than that recounted by Taylor. Often informed by the feminist postmodern theorists, the argument was that these crises were in fact crises of dominant masculinism. Modernity and its epistemology were from their beginnings deeply permeated by (co-constituted with) male supremacy, and there was no good reason for feminist strategies intended to advance democracy and equality to have to fall victim to the crises of masculinism. And, as class, antiracist, and postcolonial theorists argued, the same could be said for their own democratic projects. The modernity promoted by the West was problematic, but it was not the only form of modernity that could be promoted, or that in fact already existed. This whole range of theorists refused the particular kind of contrast between modernity and tradition

that had characterized the Enlightenment project and its successors (Eisenstadt 2000; Harding 2008).

Feminist approaches to these issues focused on unhappiness with the opposition between the constituting and constituted subjects that were centered in the current versions of Enlightenment philosophies. The subjects capable of constituting “others” as inferior through their excluding languages and social institutions and practices (their “discourses”) were imperial. And the Others so constituted had no agency; they were “dupes,” supposedly incapable of resistance to such imperial projects. What kind of subjects could avoid these two unattractive positions? How can agency and resistance be posited for (supposedly) nonconstituting subjects of knowledge and history? A short answer to this question is that different subjects can be created through negotiations with different discourses. Agency and thus resistance are primarily properties of discourses, not of individuals. Thus, creating more democratic and egalitarian discourses can produce humans capable of active negotiation with their social/natural surround (Hekman 1991).

Let us return now to make the link between Daston and Galison’s “technologies of ‘right sight’” and the project of this book.

Social Justice Methodologies as “Technologies of ‘Right Sight’”

Daston and Galison’s account links shifts in the standards for objectivity to changes in scientists’ preferred ways of observing natural phenomena—changes in research technologies. Their focus is on the history of atlases of natural phenomena, such as plant and animal species.⁸ These atlases provided the equivalent of the internet for scientists of the seventeenth through mid-twentieth centuries. They permitted scientists separated by time and space to “work together” to classify natural phenomena, and thus to help organize our ways of thinking about them. Thus they point out that the language of objectivity began to be preferred over the standard of “true to nature” only with the emergence of mechanical recording processes, such as photography. Of course skeptics soon pointed out that the photographer’s choices of the angle on, scope of, light conditions for, and size of a photograph had readily discernible effects on the resulting image. Photographs could mislead us about nature and social relations long before Stalin began cropping disliked subordinates out of official photos and long before the recent arrival of digital photo editing. Subsequent shifts in what counts as objective research have been occasioned by the arrival of other kinds of recording devices, and have sometimes required procedures that would have been

forbidden in earlier eras. For example, in the case of extremely small phenomena, it turns out to be necessary to *intervene* in the arrangement of the phenomena to be observed in order to maximize the objectivity of nanophotographs, as Daston and Galison point out. Thus the standards for accurate representations (“right sight”) of natural and social arrangements and processes have shifted in the history of science as new technologies of observation have become available.

These are the kinds of shifts that Daston and Galison have in mind when they say that “the history of objectivity becomes, *ipso facto*, part of the history . . . of the scientific self.” So the question here is: How is this kind of account of objectivity relevant to thinking about the knowledge-producing activities of the social justice movements? My argument is that such a new methodological strategy developed by the social justice movements as, for example, “starting off research from the daily lives of economically and politically vulnerable groups,” as standpoint theory recommends, is itself an increasingly recognized new way to do maximally reliable observation of natural and social relations. It is a new “logic” or “technology” of good research. It is a new methodology of “right sight” that enables us to see aspects of natural and social phenomena that otherwise would be difficult or impossible to get into focus. My argument is that this recent social history of the shift in standards for maximizing objectivity is as much a part of the history “of the scientific self” as was the shift to photography or the shift to rearranging nature in order to represent it more accurately through nanotechnologies.

Finally, we can turn to three kinds of proper scientific selves that are being produced through such new research methodologies or technologies.

New Proper Scientific Selves for Sciences from Below

Multiple and Conflicted Subjectivities Philosopher Ann Ferguson (1996) and literary theorist Lourdes Torres (1991) identify how valuable concepts of multiple and conflicted selves have emerged from feminist and antiracist concerns. Ferguson identifies a concept of the self that reveals how oppressed individuals can in fact resist oppressive practices of well-institutionalized structural forms of racism, sexism, and other such oppressive social relations. At the same time, this must be a concept of the self such that the perpetrators can be held responsible for their oppressive practices; they are not to be conceptualized as helpless tools of a deterministic social order. Dominant institutions are often represented as so well organized, so far-reaching, and so powerful that the individuals

in them who deliver their policies and practices to members of oppressed groups can seem not to be responsible for the oppressive consequences of their behavior. Administrators of the World Bank, the welfare system, or the military can seem to be just “following orders.” Trying to resist these mere “tools” of the institution, or holding them responsible for oppressive behaviors, can seem futile and even inappropriate. With such concerns in mind, Ferguson argues that the self must be conceptualized as a disunified, ongoing, social process, not as a coherent, static, completely “internal” entity.

The self is not a fixed unity, but an ongoing disunified subjective process with many levels and aspects. Each of these levels and aspects has associated ethico-political norms and self-understandings that may be different—indeed, may conflict with each other. That this subjectivity is so multiply determined explains how we can be constrained and oppressed by given social structures and internalized psychological constraints yet can bypass them by self-conscious self-reconstitutive processes. . . . we will require many networks and coalitions, membership in many oppositional communities, and what I call “bridge affinities.” A bridge affinity is a sense of subjective connection or bonding to others based on activist coalitions, friendships, and similarities rather than fixed social identities or locations (122–23).

For Ferguson, agents of knowledge and of social action are always firmly located in complex and often conflictual structural social relations, and yet are never determined by them. Both the perpetrators and their victims must be conceptualized as being capable of choosing to associate with others to deliberate and organize, in order to engage in resisting oppression and to transform those social structures. This can be done through creating and/or joining oppositional networks, coalitions, and communities in daily interactions and critical reflection. Indeed, for Ferguson, those of us who would contribute to eliminating oppressive and exploitative social relations have a moral obligation to seek out and participate in such oppositional social groups.

Literary critic Lourdes Torres (1991) points out that the influential Latina autobiographies that began to emerge in the 1980s are not much like the familiar “great man” autobiographies. She looks at three such autobiographies, by Cherie Moraga (1983), Gloria Anzaldúa (1987), and the daughter-mother authorship of Aurora Levins Morales and Rosario Morales (1986). The selves in these accounts are multiple and often

conflicted. They are members of multiple oppressed groups that sometimes compete for their loyalties. They are US citizens and also Latina. They may be lesbian and yet loving of their homophobic families. They are feminists, and yet they often need to work with their still sexist brothers and fathers in struggles against racism.

These authors stress the importance of acknowledging the contradictions such selves entail and of learning to transform such differences into sources of knowledge and power. Torres identifies linguistic strategies that are used to give voice to multiple cultural legacies in these works. The authors mix linguistic codes in different ways, writing in English but also sometimes in Spanish and/or Spanglish. Sometimes they translate for English-only speakers, sometimes not. These works articulate the “mestiza” consciousness that has developed a tolerance for contradictions and ambiguities, plural positionality, and shifting and multiple identities. The work of Audre Lord (1984), Maria Lugones (1987), and the contributors to Cherie Moraga and Gloria Anzaldua’s (1983) *This Bridge Called My Back: Writings by Radical Women of Color* provide additional influential examples where this kind of self is identified.

Indeed, feminist and antiracist work more generally has been full of metaphors of a split consciousness, from W. E. B. DuBois’s “double vision” to bell hooks’s *Feminist Theory from Margin to Center* (1983) and Patricia Hill Collins’s “Outsider Within” (1986). As bell hooks (1990) argues, one must learn to *choose* “the margin as a space of radical openness.” Bilingual students often report powerful and disturbing senses of divided loyalties to their immigrant families’ home cultures and to the US or cosmopolitan university culture in which they find themselves, and into which we professors are supposed to train them.⁹ All the challenges of translating texts can appear in the lives of subjects who cannot be “at home” in one or more of their cultures. Learning to see this kind of difference and displacement as a source of creativity and power requires support groups, and exposure to social movements and to their thinkers who articulate the positive aspects of such potentially transformative positions.

Relatedly, feminist work of the 1970s and after often noted the “hyphenated identity” issue. It seemed that a liberal-feminist, socialist-feminist, or Catholic or Jewish feminist would each embody a kind of contradiction in terms from mainstream perspectives. Prevailing institutions thought of feminist revisions in dominant theories as an “outside,” and usually as a both incomprehensible and disturbing force that should be resisted by the “inside,” well established, proper, authoritative, and parental disciplinary or social movement thought. Thus a woman

scientist, woman philosopher, woman priest, or woman president marked a deviation from norms—they were oddities who threatened the centrality, legitimacy and privilege of the norm. However, feminists pointed out that the great creativity of feminist work originated precisely in being forced to think from the location of such contradictions—thinking from the location of the hyphens, so to speak. Sociologist Dorothy Smith captured this insight in noting that the puzzled consciousness of women graduate students confronting classical sociological theory's pronouncements on natural or normal gender roles was one fruitful starting point for a standpoint of women. A "fault line" opened in the consciousness of these students who couldn't recognize themselves and their life experiences in the social analyses of Weber, Durkheim, Simmel, Marx, and the other "greats" in their theory courses. Mentions of Smith and Collins draw attention to how the success of standpoint methodology and strong objectivity projects depend upon just such socially embedded, multiple, and contradictory subjects of the production of knowledge.

My point here is that such multiple and conflicted subjectivities offer possibilities for progressive transformation that are less available to the unified, perfectly coherent, and autonomous subjects (should any actually exist) to which we have all been supposed to aspire. Progressive social transformations require that our selves be recognized by us as dynamic, containing forces from the past and new possibilities for the future, and as being capable of thoughtful response to changing circumstances. Thus, the multiplicity and conflict enable us to recognize ourselves in response to different claims on our responsibilities and rights in different social contexts. We can learn to negotiate women's roles, on the one hand, and the typical roles of philosophers or scientists as critical thinkers, authors, professors, department chairs, college deans, and university presidents. Those interested in selling us things we don't need, or in getting us to vote for policies that will be bad for us develop powerful talents for appealing to some aspect of ourselves that we would not otherwise activate, or at least that we would not be proud to activate. Progressive politics, also, has obviously figured out how to appeal to people's "better selves" to gain support for desirable social transformations.¹⁰

How should such researchers position progressive research projects in prevailing social relations now that we can no longer legitimately claim to be able to produce "the view from nowhere"? Two important strategies can provide resources here. One is participatory action research (PAR) and projects with related commitments; the other is at-

tention to intersectionality. Both of these strategies originated in social research, yet they are relevant to natural science research also.

The Strategic Researcher: Positionality Perhaps the earliest articulated home in the last half of the twentieth century for conscientious positioning of research projects in progressive social relations is PAR in the social sciences. This emerged initially as part of efforts in the 1970s to conduct research that was *for* poor people, not just about them. Its inspiration lay in the work of Paulo Freire, in liberation theology, in New Left politics, and in various kinds of “people’s science” that emerged around the globe as they were animated by the ferment of the 1960s.

PAR proposed a model of research which rejected fundamental assumptions of the positivist natural science model that had become dominant in the social sciences. It also differentiated itself from ethnographic research of the day that kept its focus firmly on the internal symbolic and material relations of unfamiliar cultures, which were most often in the Global South or among poor or minorities in the Global North. In neither of the rejected cases was there a focus on the macrosocial forces that shaped the material and symbolic social relations responsible for producing the conditions under which the informants and observed subjects lived. Nor was there a focus in either on the disciplinary, cultural, or era-wide assumptions and practices of the positivist or ethnographic researchers themselves. The researcher’s assumptions and practices were not interrogated in the same ways as were objects of study. This was the context in which PAR refused the hierarchical relation between observer and observed that was assumed by both models. In one of the more ambitious statements of PAR goals, the new research was to incorporate education and activism in order to enable economically, politically, or socially vulnerable communities to learn how to figure out what kind of information they needed, what the required research would be, and how to conduct the community relations so that they could themselves transform their own lives (Park 1993).¹¹

PAR includes a range of such attempts to redistribute control of research processes in ways that are more accountable to vulnerable communities with stakes in the research. In a 2008 speech to the American Archaeology Association, the philosopher of archeology Alison Wylie identified a continuum of PAR practices in the case of archeological research. These started with minimalist efforts at consulting with the “descendant communities” (today’s indigenous peoples) and obtaining the kind of informed consent that the World Archeological Congress First Code of Conduct had begun requiring in 1991. A more robust

participation creates reciprocity arrangements in which researchers give resources of value back to the descendant community, such as research training, historical research, and advocacy for relevant potential governmental and nongovernmental resources on behalf of the community's needs. The most ambitious form of PAR requires deep transformations in how researchers think about their work.

Consultation and reciprocity turn into collaborative practice when descendant communities get directly involved in the intellectual work of archeology. It is a matter of according control to collaborative partners in areas traditionally reserved exclusively to disciplinary authority: setting the research agenda and shaping both the process and the products of archaeological inquiry (Wylie 2008, 5).

In this ambitious form of PAR, researchers assist a particular community in formulating a problem, researchable by members of the community initially with assistance from the trained researchers, that will enable the community members to become active agents in improving the conditions of their own lives as they experience them.

This is not usually a quick or easy task. The discussion in chapter 3 revealed how difficult it was to identify the most important problems in attempting to eliminate the immiseration of poor Third World women. Note that in 1970 Ester Boserup did indeed start from women's lives to argue that development policies were leaving them out. She drew on her earlier work with women in the developing world. Yet the prescriptions that her diagnosis produced—namely, to add women to existing policies and practices—did not turn out to have the kind of empowering impact for which she and others had hoped. Now, many decades later, we can understand why that was so. It took lots of work over several decades to be able to identify particular aspects of the social relations of patriarchy, capitalism, traditional societies, and modernization—to name the main institutional perpetrators of these women's immiseration up to that point—that had to be changed if poor women were to be able to gain more control over their lives.¹² This process of learning required continual collaboration between trained researchers and concerned local people. The consciousnesses of both groups were transformed through this process. (We return to these issues below.)

These more deeply collaborative processes have received attention recently. As indicated, maximal collaboration in PAR requires redistributing control over the intellectual agenda and processes of research,

as Wylie (2008) argued. For collaborative research, the interests of researchers must be *balanced* with the interests of the relevant communities. Yet the very idea of redistributing intellectual control over the agenda and processes of research can be incomprehensible and terrifying to conventional researchers—as Wylie reports was visible in the field of archeology when such collaborations were first proposed. However, there do exist histories of at least some researchers learning to balance their own interests with those of other stakeholders in such fields as health, medical, and environmental research and in the appropriate technology movement. Such an idea becomes less terrifying as it is practiced. Collaborative research projects have been advancing not only in such fields as archaeology, but also in environmental and health research (Colwell-Chanthaphonh and Ferguson 2008; Fortman 2008). Moreover, scientists themselves always must “balance their interests” with those of their funders and sponsors—even if one thinks they don’t do so as vigorously as the antiauthoritarian and citizen science movements have been demanding. Scientists also negotiate routinely with experts in other fields with whom their research requires collaboration: engineers, statisticians, and many others.¹³ Negotiating such relations is what social life is about, including the social life of science.

One can see both standpoint methodology and the citizen science projects described in earlier chapters as being committed in different ways to similar redistributions of authority in research projects. Neither is usually conceptualized as a form of PAR. I am suggesting that their differences notwithstanding, this commitment to the redistribution of research authority links them to PAR agendas.

Of course PAR has not been politically or cognitively perfect. It can be co-opted by groups not actually committed to empowering oppressed people to take control of their own lives, as has been the case with all too many NGOs working in development contexts in the Global South (Cooke and Kathari 2001).¹⁴ Moreover, if PAR is understood only as a commitment to retrieving suppressed cultural forms of knowledge and ways of life, as is sometimes the case, it does not in itself automatically lead to resisting sexist, racist, and other damaging features of traditional cultures. That is, it takes explicit attention to such controversial social relations as those shaped by gender, race, ethnicity, and class to ensure a chance for fair treatment of such oppressed groups. Nevertheless, PAR offers good directions for knowledge seekers who strategically position their agendas to produce the sciences and philosophies of science that simultaneously advance the reliability of research and also provide valuable information and experience for oppressed communities.¹⁵

Note that the field of science studies showed the value of using *social science* methodologies to understand the natural sciences, their objects of study, their research processes, and the research ideals that supposedly directed them. In effect, these historians, sociologists, economists, political scientists, and ethnographers revealed how natural sciences have always been “thickly” social projects: they have been socially produced and constituted “all the way down” into their ontologies and epistemologies. As seen in earlier chapters, the social scientists set out to explain how sciences and their societies co-produce and co-constitute each other. Consequently, one could say that they turned the natural sciences into particular forms of social sciences: ones that took as their objects of study parts of our environments that seem untouched by human hands. Yet the very act of taking them as objects of study embedded such “natural phenomena” in cultural narratives and practices. Thus, if philosophers of science would be “scientific,” as logical empiricism has always avowed they should be, it turns out they will have to get more familiar with the social science research goals and strategies that the field of science studies has found useful.

A different set of positioning concerns has been involved in the focus on studies of “intersectionality.” The concept of intersectionality was developed initially by critical legal studies scholar Kimberle Crenshaw (1989), who intended to intervene in legal thinking that could not conceptualize the importance of addressing the needs of black women and, by extension, any women of color. As Crenshaw argued, black women were perceived as being “too similar to Black men and white women to represent themselves and too different to represent Blacks or women as a whole” (Cho, Crenshaw, and McCall 2013, 790). Consequently their needs and interests were systematically ignored or distorted in legal contexts, as well as in white feminist and antiracist theory and politics. Insisting on the recognition of intersectionality required that every individual and social group be recognized as existing at the intersection of whatever were the powerful structural elements of the social order. So black women’s opportunities, responsibilities, and limitations are shaped by forces of race, gender, and class, among others. So, too, are those of black men, white women, white men, and everyone else (Cho, Crenshaw, and McCall 2013). Everyone’s daily lives are conducted at the intersections of all of the powerful structural forces in their social environments.

In research this directive has two foci. One focus is on the people and processes being studied. How are black women’s opportunities and burdens created not only by race relations, but also by class and gender

relations (among others)? How are the *different* opportunities and burdens of white women, white men, and black men created by those very same multiple and intersecting structural social relations? A second relevance of intersectionality theory is to the position of the researcher in science, philosophy, or science studies, for example. How does her location in multiple, intersecting structural social relations affect what research she can and does do, and how she does it? And what benefits and costs does such an intersectional position deliver to the research's stakeholders? How are our research opportunities, priorities, and resources, as well as its limitations and blind spots—our systematic ignorances—shaped by the intersected race, gender, and class positions we occupy? This is a question about us as individuals, but also about us as knowledge workers in particular kinds of institutions, located at particular social and historical times and places. Thus, attention in our analyses to issues of intersectionality improves the quality of our research. It works against irresponsible universalizing tendencies in our thinking and practice. And it can induce a welcome dose of modesty about the ability of our work to provide the “one true account” that perfectly reflects reality at any particular moment. There are always other locations in structural social relations from which the phenomena and issues reasonably may well look different. Thus, attention to intersectionality requires careful positioning of “the scientific self” and its research project in existing social relations.

In these proposals for better ways of thinking about individual and collective knowing subjects and the positionality of their research projects, one can begin to see how knowers are not fundamentally autonomous, self-creating, culture-free individuals. In a variety of ways, these accounts draw attention to the researchers' inevitable and necessary interactions with networks, communities, or social movements in the production of knowledge. Or, better, individual researchers inevitably collaborate with their communities to produce knowledge whether or not they are aware of this collaboration.

*Speaking Both as a Community and as an Individual Who Knows:
Really, Really “Big Science”*

What are the social contexts necessary for social justice transformations of researchers and their research to occur? This issue has arisen in earlier sections. The standard image of the lone genius scientist that is used to spur on seventh graders and graduate students to “aim for a Nobel Prize” became anachronistic some seventy years ago with the beginnings

of the field of the social studies of science. However, this image still appears in glossy ads for science careers and for pharmaceutical products. It still directs assumptions in epistemology and philosophy of science thinking. In this image, the scientist works alone at his chalkboard figuring out equations and then, with a trusty assistant, tinkers with his lab equipment and materials in order to produce facts that will shock or thrill the world. In mainstream philosophy, the ideal philosopher of science, too, is represented as a lone worker (if not a genius) in the solitude of his study, clearing the cobwebs of superstition and false belief from his mind so that he can, like a “glassy mirror[,] perfectly reflect the logical structure of sciences that is ‘out there’ for the reflecting” (Rorty 1979).

Five decades ago, Derek De Solla Price (1963) pointed out that research such as the Manhattan Project required many scientists from many disciplinary specialties to coordinate their research in order to produce such facts as those that resulted in the atomic bomb. He argued that this quantitatively different project introduced qualitatively different research processes. The new era initiated by the Manhattan Project came to be referred to as “big science,” whether it was militarism or a search for the cause of cancer that motivated the research. Another way to think about this is in terms of craft versus factory models of manufacturing. The kind of “craft” production of facts that is suggested by the “lone genius” image still can be valuable in the early stages of developing a new research field. James Watson (1969) provides a report of such work that established the structure of DNA in his *The Double Helix*.¹⁶ After the craft work stage of the so-called context of discovery, a “factory” model becomes necessary to move beyond the initial insight in order to test it and provide usable facts. Many researchers with different sets of skills are needed to design research and collect data to which the original insight has brought attention. In the usual “big science” case, no single researcher fully understands every part of the research process. The principal investigator must rely on the teams and networks of engineers, physicists, statisticians, software programmers, and other experts to produce reliable results of research, for which many of them will get to claim responsibility.

Subsequent work in the field of science studies has identified a second expansion of the “bigness” of scientific research. The establishment and management of many complex social relations beyond those with other participating scientists are also necessary to organize, produce, and disseminate research. There are the relations with the institutional funders and sponsors of the research, mentioned earlier. There are also the relations with conference committees, journal editors, and other publishers who will assist in disseminating and thus helping to confirm or

disconfirm the research results. There are the relations with mentors, students, competitors, and critics at various stages of the research. Also, various kinds of subsidiary workers must be organized and managed: lab technicians, systems engineers, project managers, secretaries, equipment manufacturers, and suppliers of materials. Funders and sponsors are always acknowledged in scientific publications. Yet neither they nor the rest of these participants get to sign their names as authors of the reports of the research results discussed by Price, even though their expertise and service is crucial to the success of the research. Let's add this extension of participants in the production of scientific knowledge to Price's "Big Science," so that we can begin to see "Really Big Science."

Earlier chapters have argued for the inclusion of yet a third extension of contributors to the production of scientific knowledge—namely, those brought into that category by standpoint methodology and its strong objectivity projects. In such inclusion processes we get to see how various kinds of already existing or at least already forming communities should be considered as part of the collection of subjects or agents of knowledge. For the women, gender, and development research to occur, as discussed in chapter 3, communities of already forming feminist researchers in the North had to exist—for example, communities that enabled Ester Boserup's insights, and then later revisions in the feminist critiques of development policies. Moreover, these communities and networks had to interact with groups of activist women and men that were forming in the North and South, as they revised and then revised again their gender and development analyses. Meanwhile, within national and international governmental and nongovernmental organizations, institutes, agencies, and networks, feminist women and men were organizing to contribute their share to the debates and discussions shaping these projects.¹⁷ Should we say that these processes create really, really big science? In any case, these various networks and communities are often represented by individuals, who speak and write both as individuals and as knowing communities. (We return below to this kind of knowledge producer, who is simultaneously an individual and a community.)

Glimpsed in these accounts is a distinctive kind of process leading to transformative "communities that know." In a few science studies accounts, there is a recognition that the issue cannot be just to add these new kinds of participation by individuals, networks, and other communities to research projects. As political theorist Mark Brown (2009) puts the point, "recent efforts to promote public participation in the politics of science capture only part of what it might mean to democratize science"(8). A democratic science "depends on building relationships

between and among different types of representative institutions and the citizens who animate them" (ibid.). Such a project assumes a "scientific self" that values and knows how to seek out and discuss scientific projects with all the stakeholders. Thus, such a self is willing and able to share intellectual control of the project with all of such stakeholders.

As indicated earlier, it is probably theorists and practitioners of collaborative research who have thought most about how to do this. Such knowers must work with other stakeholders to conceptualize and then design contexts in which individuals, interest groups, and institutions can come to informed agreement about how to proceed so that all participants' understandings of the issues and of their investment in them are improved and enlarged. These accounts call for developing effective public forums in which scientific and technical issues can be articulated and debated by the institutions and citizens, inclusively understood, who will be affected by them.

Brown, like others who explore such democratic processes, objects to the tendency of scientific and technology experts to turn political issues into merely technical ones that only they are qualified to manage.¹⁸ Both the move to create a "pure science" that can make claims that perfectly correspond to reality and the radical relativist critique of this position obscure the processes that are necessary to democratize science. Both assume that politicized science is controversial because it is politicized. But all sciences are politicized, Brown argues. Rather, the controversies are over whose values and interests should politicize science. What's controversial is that some powerful *other* person's or group's values and interests are directing science! "Enlightenment thinkers legitimated both modern science and representative government by appealing to the common sense of ordinary citizens, even as they reserved the actual practice of both science and government to an elite" (ibid., xii). Direct attention needs to be paid to democratizing the actual practices through which both sciences and governments design and manage their projects.

To function effectively in such necessary public forums, this proper "scientific self" must be willing and able to change her mind and her plans. She must be willing to give up some of her cherished commitments, at least for the project at hand, in order to advance others that she also values. Thus, these authors reject the idea that knowledge can advance through discussions between individuals, groups, and institutions with rigidly fixed identities. Indeed, some of them tend to see the demands of feminist, racial, and ethnic groups as "identity politics" that can never move past the stage of debilitating "politics of resentment," in which everyone's "bottom line" is so fixed that no one can

learn anything. All parties cling to their positions as hurt victims, each suspicious of the other, and no emancipatory movement is possible. Of course it is easy to recommend that those engaged in oppositional politics “make nice” if one has the luxury of life circumstances that one does not want to give up! At any rate, the field of conflict resolution has been developed precisely to get labor negotiations, international relations, and marital struggles past such unproductive stalemates (Deutsch and Coleman 2000; Fisher, Ury, and Patton 1991). Would expertise in conflict resolution advance the production of knowledge and of the social lives of scientists and philosophers of science?

Hints of such productive processes have appeared earlier in discussions of the science projects emerging from progressive social movements. Recollect that a feminist standpoint is fundamentally the possession not of an individual, but rather of a community that has been engaged in deeply critical discussions aimed at figuring out how to get the knowledge that will be useful to particular groups of women in their distinctive disadvantaged locations in global gender, race, class, and colonial relations. Such discussions have had to occur within feminist communities, and in interaction with the community’s surrounding environment of educational, research, funding, governmental, economic, and other institutions and groups, as well as with other democracy-focused groups. Similarly, postcolonial science and technology discussions remain deeply contested, with different agendas developing over time in response to each other’s criticisms and to response from surrounding institutions, as postcolonial theorists and activists try to work out what are the “least bad” scientific and technology strategies for their constituents to adopt, of those visible to them. Such processes were also described in David Hess’s “globalization from below” citizen science movements, and in the related new interactive models of communication between sciences and their publics.

My point here is that a “knowing community” is always dynamic, as its representative institutions and the citizens that animate them engage in critical debate, rethinking and revising scientific and technical agendas and their own roles in advancing them. This desired quality of “knowing communities” is another aspect of the “scientific selves” that are called for in recent attempts to relink sciences and their philosophies to democratic social relations.

One more complication: All this said, it is nevertheless individuals from some particular knowing community who speak and write their community’s knowledge to outsiders, as indicated above. That is, the new proper scientific selves that emerge from social justice projects speak

both as individuals and as communities. Women or men who represent and are informed by widely discussed feminist interests negotiate in international contexts as they try to change World Bank policy. Women or men who represent low-lying Pacific island peoples speak in the United Nations about how climate change will flood their homelands. Rigoberta Menchú famously spoke about the horrors that CIA-aided militias had inflicted on “her,” by which she meant herself and all the other members of her indigenous group (Menchú 1987). All the members of that group were wounded by assaults on individuals and on the group’s ways of life. Menchú’s speech represented her community’s knowledge, though she articulated it in her own way. Indeed, as national and international rights are recognized for previously silenced peoples around the globe, increasing numbers of new kinds of people participate in local and global planning and negotiations. They each speak as grassroots activists and cosmopolitan negotiators, as individuals, and as knowing communities. Moreover, daily interactions between local and cosmopolitan contexts develop knowledge that is different from that of those who only live in their own communities or in cosmopolitan contexts. Negotiating back and forth between the local and the cosmopolitan itself requires the development of distinctive skills and talents.

Really, Really Big Philosophy of Science

Philosophy of science is not usually “big” in the sense that was intended by Price’s use of this term. Yet the subject or thinker of philosophy of science is in important ways always collective, as I argued earlier in this chapter. Moreover, we have seen how philosophers’ interaction with distinctive aspects of their own historical eras, intentional or not, have powerfully influenced the focus and content of their philosophies of science.

My argument in this book has been intended to support self-consciously really, really big philosophy of science in every research discipline (not just philosophy departments) that seeks out and promotes the underrepresented insights and critical perspectives of economically, socially, and politically vulnerable groups in the West and around the globe. Such a recognition of the resources that the cognitive or intellectual norm of objectivity and the social justice norm of diversity can bring to each other promises to relink sciences and their philosophies to the democratic goals that can enable modern Western sciences and their philosophies to earn the designation of being universally valued—even though they are never uniquely so.

Notes

CHAPTER ONE

1. Later in this chapter we will see that these poor were not, in fact, inadvertently “left out” of modernization plans. Rather, their further immiseration was accepted as a necessary cost of the development programs that were put in place after World War II.

2. There were other “losers” in World War II, namely those nations that had given support to Germany.

3. And economic restrictions on those nations that had given support to Germany.

4. My account here follows those of Hollinger 1996 and Sarewitz 2011.

5. Of course Carnap and Reichenbach had argued for value-free sciences in the 1930s, as had Max Weber in the nineteenth century. Moreover, in the 1930s and '40s socialist British scientists had insisted that only socialist-directed research could truly qualify as being free of particularistic social values and interests and thus could truly deliver benefits for everyone (Werksey 1988 on “Bernalism”). So this is certainly not the first time such a project had been launched.

6. Such gender issues are pursued further in chapters 2 and 3.

7. See chapter 4.

8. Mies (1986) also drew on this idea in discussing how the “development pie” of resources was greatly expanded by the appropriation of women’s and peasants’ labor and land rights. See also Harcourt (1994) and chapter 3 below.

9. I use Hess’s categories and many of his examples here, but provide additional examples and elaborate a couple of his points in somewhat different ways.

10. If it ever was—an issue postcolonial science and technology counterhistories have taken up. See Harding 2011.

11. This and the following issues are discussed further in chapter 7.

12. “Black,” capitalized, has come into use to signify an active stance that reclaims this identity for antiracist projects (as in “Black power”). In contrast, “black,” lowercase, is the standard term chosen by non-blacks to designate African Americans by a word for their skin color. Sometimes it is not clear in which sense the term is used, and in such cases this text will follow standard practice and use the lowercase “black.” Yet readers are requested to keep in mind the negative implications of continuing to characterize this group of people by the biological marker chosen by their oppressors, who themselves presume that their own biological legacy has granted them some sort or other of natural superiority.

13. Important origins of the mainstream movement include Thomas S. Kuhn’s *The Structure of Scientific Revolutions* (1962/70), David Bloor’s *Knowledge and Social Interests* (1977), and Jerome Ravetz’s *Scientific Knowledge and its Social Problems* (1971). See also Hess (1997) and Golinski (2005), and such readers as those edited by Biagioli (1999), Jasanoff et al. (1995), and Hackett et al (2007).

14. Sheila Jasanoff (2005) developed these notions in her own study of how standards for the objectivity of biotechnology research varied according to the particular national political climates in Germany, the United Kingdom, the European Union, and the United States. Her edited collection (2004) provides a number of related studies. Shapin and Schaffer (1985) had made the point earlier in their study of how the ideal citizen of the new democracies and the “modest witness” of scientific experiments were co-constituted through the correspondence between Hobbes and Boyle. However, I am pointing out here that the other science studies movements—feminist, antiracist, and postcolonial—had earlier centered this issue in their accounts of how sexist societies tended to produce sexist sciences that in turn provided resources for the sexist societies, and likewise for other kinds of societal political tendencies. Evidently the idea was overdetermined.

15. Of course there are exceptions to such claims.

16. I make such an argument about feminist and postcolonial studies in Harding 2009 and Harding 2011b.

17. Several chapters in Harding 2008 focus on these feminist issues; earlier review essays are surveyed in chapters 4 through 6. Banu Subramaniam (2010) provides a valuable recent overview of important feminist issues concerning the relation between writings about women in science and those about feminist science theory.

18. Rooney explicitly draws on standpoint epistemology to frame her argument. “Drawing in part on a standpoint epistemological perspective, I will argue that certain (meta) epistemic advantages accrue to feminist epistemology’s marginal status, facilitating, in effect, specific insights about epistemology that are not otherwise available” (2007, 5).

19. This issue is taken up in chapter 3.

20. It is also the case that some formerly colonized societies have entered what could be regarded as a post-postcolonial era in that after extensive critical

examination of the nature and persisting effects of the colonial era on their societies, they now no longer center the formerly colonial powers in their thought. The United States and Europe have become increasingly irrelevant to much of these societies' thinking and planning, without underestimating the power of continuing residues and reinventions of colonial relations.

21. The East Asian group has produced a journal—*East Asian Science and Technology Studies*, published by Duke University Press—since 2006. The African group has begun to stimulate numerous conferences and seminars on the African continent as well as elsewhere. See, for example, the report on the February 2014 conference in Johannesburg, South Africa, on “Mapping Science and Technology in Africa: Travelling Technologies and Global Dis/orders,” at <http://sts-africa.org> and also at <http://www.4sonline> 7/14/2014.

22. The 2014 annual meeting of the Northern group was held jointly with ESOCITE in Buenos Aires with presentations in Spanish, Portuguese, and English. More than nine hundred researchers participated.

CHAPTER TWO

1. For another version of this chapter, designed for a different readership, see Harding, forthcoming.

2. For examples of this kind of claim in early feminist research, see Bleier 1979; Brighton Women and Science Group 1980; Fausto-Sterling 1994; Haraway 1989; Gilligan 1982; Harding 1987; Harding and Hintikka 1983; Hubbard, Henifin, and Fried 1982; Kelly-Gadol 1976; Lowe and Hubbard 1983; Millman and Kanter 1975; and Reiter 1975.

3. Just how value-free quantitative research can be is itself a controversial issue. Conflicting views of the nature of mathematics, and especially of such fields as statistics, sporadically trouble notions that mathematics is or can be value-free (cf. Bloor 1977; Kline 1980; Restivo 1992).

4. A more extensive analysis of one particular field of research—feminist criticisms of assumptions shaping development policies and practices in the Global South—is provided in chapter 3.

5. The original papers by sociologist of knowledge Dorothy Smith, political theorist Nancy Hartsock, sociologist of science Hilary Rose, philosopher Alison Jaggar, historian of science Donna Haraway, sociologist Patricia Hill Collins, and myself are reprinted, along with a number of critical and reflective later essays, in Harding 1987. See also Harding 1986 and 1991.

6. Influential discussions of this issue with respect to diverse forms of discrimination can be found in Jasanoff 2005 and Reardon 2005.

7. Hacking (1999, 21ff) is certainly right about how often the term is used in this way. Yet, as we will see below, I suggest there are still interesting things to be said about the objectivity of scientific ideals and practices.

8. Megill 1992 provides a similar list of referents for the term.

9. Of course feminists have also questioned data collection techniques, but that is not the main focus of standpoint methodologies.

10. Recollect that Kuhn (1970) noted that researchers who are well trained in one scientific discipline can often bring useful insights to another.

11. Yet it is usually neither necessary or desirable to ban such research. More productive is open, broad-scale democratic deliberation about what kinds of research best serve the goals of multicultural democracies, which is one of the overarching themes of this study. Note, also, that the restriction on what should count as desirable diversity distances the account of this book from calls for “mere diversity.”

12. The language of “from below” originates in thinking in terms of the ruling “top” and ruled “bottom” of hierarchical social systems.

13. Compare, for example, the two anthologies addressed respectively to Dorothy Smith’s and Nancy Hartsock’s particular formulations of standpoint theory (Campbell and Manicom 1995; Kenney and Kinsella 1997). Each collection of essays originated in panels from those author’s respective disciplinary organizations. There is virtually no mention in either volume of the standpoint project emerging at the same time from feminist work in the other discipline.

14. I do not use the term “interdisciplinary” because it tends to conflate three of these meanings (all except “deeply disciplinary”).

15. In addition to the two collections of essays addressed respectively to Dorothy Smith’s and Nancy Hartsock’s work mentioned above, two extended analyses and critiques of standpoint theory by distinguished feminist theorists appeared in *Signs: Journal of Women in Culture and Society*, each with responses by some of the original standpoint theorists (Hekman 1997; Walby 2001). A recent collection of essays brings together the original standpoint essays along with a number of diverse readings and criticisms of standpoint theory (Harding 2004). Additional analyses and criticisms can be found in book reviews of the work of the standpoint theorists, as well as in the work in philosophy of feminist empiricism (e.g., Grasswick 2007; Longino 1993; and Potter 2006).

16. This account expands on the one given in Harding 1992.

17. In early writings I used the language of “epistemic privilege” to describe what was at issue in standpoint theory. I was thinking of the lack of credibility constantly attributed to women’s reports of rape and domestic battery, of their bodily experiences, of their harassment and unequal treatment in workplaces, and so on. However, the term “epistemic privilege” misled some readers to assume I meant that such reports were incorrigible, in spite of my accounts of how we often revise our reports of our experiences in light of observations by therapists, historians, and others; they are always corrigible. I no longer use this language.

18. To turn women into a group “for itself” (that is, conscious of the structural causes of patterns in our lives) instead only “in itself” (that is, as others define us).

19. Can children, mute people, mentally disabled people, and others who cannot articulate their experiences and values as fully abled adults do develop their own standpoints? Can those who can’t organize as a group “for itself” do so? What about animals? Can fully abled adults start off from the daily lives of members in such groups to develop their standpoint? On the one hand, such possible subjects or agents of standpoint methodology cannot activate all the powers of social justice groups that standpoint theorists intend to activate. On the other hand, there may be good reasons to consider standpoints as a continuum

of possible positions with varying powers. This interesting issue cannot be pursued further here.

20. Note that the essay by Haraway in which she introduced this term originated as a commentary on my *The Science Question in Feminism* at a Pacific Division meeting of the American Philosophical Association.

21. I am not claiming that hooks and other authors who do not explicitly refer to standpoint theory or strong objectivity are merely tweaking the arguments developed by the feminist standpoint theorists cited earlier. Rather, I proposed earlier that the strong objectivity and standpoint positions tend to emerge whenever new groups that oppressed peoples organize on their own behalf (“for themselves”) critically evaluate the inadequacies of dominant views. The strong objectivity program and its standpoint theory are organic “logics of scientific inquiry” for creating “sciences from below.”

22. See, for example, these subsequent handbooks: Jasanoff et al 1995; Biagioli 1999; Hackett et al. 2007.

23. Anderson 2009 identifies several kinds of alignments between postcolonial theory and the social studies of science and technology (SSST). However, my focus is on alignments between advocacy of “strong objectivity,” on the one hand—which, I argue, appears in all recent democratic liberation struggles—and SSST, on the other.

24. Nor, I note, have the issues in Harding 1986 or Harding and Hintikka 1983 been taken up by the field.

25. See citations in note 17 to this chapter. To be sure, it is not that the leaders of the science studies community were completely unaware of these issues. Rather, the critiques of science from the antiauthoritarian social movements evidently seemed to people working in SSST to offer no challenges nor any opportunities for them to reposition their own analyses.

26. See, for example, the call for papers for the next (fourth) *Handbook of the Society for the Social Studies of Science* (to be published in 2016) at the 4S website as of July 2013; as well as chapter 1, note 22 in this volume (about ESOCITE).

27. Cf. Shapin 1994 on truth; Schuster and Yeo 1986 on scientific method; and Lloyd 1984 and Prakash 1999, among others, on rationality.

28. Philosopher Sarah Richardson (2010) provides a useful account of the institutional practices (conferences and journal issues) in the history of feminist philosophy of science from the 1970s on that made it immensely influential outside of philosophy, even though it has remained marginalized within the field.

29. For classic examples, see Epstein 1996 and the Boston Women’s Health Collective 1970.

30. See, for example, Maffie 2009; Turnbull 2000; Verran 2001; and Watson-Verran and Turnbull 1995; as well as Harding 1998, 2008, and 2011.

31. But see Elam and Juhlin 1998.

CHAPTER THREE

1. A related excellent literature that centers both feminist and postcolonial standards for strong objectivity is the feminist international relations literature.

See, for example, Enloe 2013, Tickner and Blaney 2013 and 2014, and Tickner 2014.

2. Of course the conventional hostilities between some quantitative and some qualitative researchers are misplaced. Each kind of research is necessary for the successes of the other. Both quantitative and qualitative analyses are necessary to ensure the significance of what can appear to be only quantitative or qualitative methods. For example, the significance of the particular choice of subjects of qualitative research must be justified by quantitative assumptions (is this group of informants in relevant ways anomalous or not?). And quantitative research makes qualitative assumptions in selecting its particular foci and deciding on the significant variables. I set this issue aside here (see Jayaratne and Stewart 1991). In the prefeminist work we will see errors made in both kinds of gender assumptions.

3. I refrain from discussing “civilized” versus “uncivilized,” “savage,” or “barbarian”—terms that can also be found in the early colonial era.

4. The binary of “haves” versus “have nots” was used by some journalists in this period.

5. See, for example, accounts of this history in the opening section of Visvanathan 2011.

6. The question of just who women and men are is itself differently assessed in different cultures, as, for example, Oyewumi (1997) has argued. Moreover, which genders and sexualities individuals claim at any given time has become a more complex matter in the world of transgender, transsexuality, and lesbian, gay, bisexual, and queer identities and practices.

7. And a more critical perspective on “overpopulation” would target rich people, who use a disproportionate share of the earth’s natural resources, commit a disproportionate share of environmental damage, and in many cases certainly do not control their reproductive practices. (Think of the Kennedys!)

8. In 1994 I had the opportunity to travel a small part of the “Silk Road,” visiting several different kinds of silk manufacturing sites in Thailand. One such site was a factory consisting of some twenty large looms set up under the trees outside a small two-room headquarters building where yardage of silk cloth could be bought at wholesale prices. In this factory women wove silk with their children playing at their feet and nearby, and there were vats where the silk threads were dyed. The site also included gorgeous clotheslines of drying silk cloth, and an area containing basket trays of cocoons where the silk thread was being manufactured. Another manufacturing site was a co-op where women in some fifteen households in the village raised cocoons in baskets in the rafters of their houses; each woman dyed her own silk in large wooden tubs, and wove silk at a loom at the front of the house looking out on the village street. The whole manufacturing operation was part of the household and village environment. The women sold their silk cloth to someone who picked up the material every week or two. Several other sites I visited exhibited various intermediary levels of manufacturing organization.

9. A friend who is fifteen years younger than me revealed that in the 1930s her father’s impoverished Maryland family “sold” him at the age of eight to become an indentured servant to a neighbor farmer’s household.

10. I say “mostly” because the British, for example, destroyed local industries in both Africa and India in order to create markets for their own products. See, for example, Rodney 1982.

11. Even the great trading companies that were one of the three kinds of corporate investors in the “voyages of discovery” in earlier centuries were largely under the control of individual nation-states: the Dutch East India and West India Companies, the British East and West India Companies, the Hudson’s Bay Company, and so on. (The other two types of corporate sponsors of the voyages were the competing empires themselves—such as Spain, Portugal, France, England, and Holland—and the Jesuits. See Harris 1998.)

12. Though socialist theory, too, remains an Enlightenment theory in significant respects.

13. Historically it has diagnosed discrimination against women as being caused by ignorance and bad attitudes which are entrenched in law and custom. Consequently, it has prescribed the re-education of both women and men about the results of scientific testing of conventional beliefs, the elimination of “bad attitudes” toward women’s and men’s actual capabilities, and transformations of legal systems to protect women’s human rights (cf. Jagger 1988).

14. Last year it was revealed that the Los Angeles Police Department had failed to pursue thousands of rapists about whom evidence collected in “rape kits” had been stored in the backrooms of police departments. The city hadn’t provided the funds to investigate such cases, the police department reported. The statute of limitations for rape was three years, so most of the rape kits would very shortly cease to be acceptable as legitimate evidence.

15. With apologies to Amartya Sen for the play, in the heading of this section, on the title of one of his important feminist analyses.

16. When Dominique Strauss-Levy, a former director of the World Bank and the left’s preferred candidate for the French presidency, was charged with sexually assaulting a maid in a New York hotel last year, chaos ensued in left and other progressive responses. Strauss-Levy ended up not charged with a crime, and the woman was dismissed as an unreliable informant. Did he or didn’t he? Subsequently, several women came forward to testify to other instances in which he had not understood that “‘no’ means no,” as the old take-back-the-night chant went.

17. Or perhaps such street demonstrations should be dated back to Tiananmen Square in 1994.

18. See, for example, several of the selections in section 4 of Visvanathan (2011), and all in section 5, “Women Organizing Themselves for Change: Transnational Movements, Local Resistance.”

19. Trevor Pinch and Suman Seth, in discussions at the “Relocating Science and Technology” conference, Halle, Germany, July 2012.

CHAPTER FOUR

1. In the title to this chapter I borrow the structure of the title of Colin Scott’s (1996) account of the Cree goose hunters.

2. Recollect the definitions in chapter 2 of exceptionalism and triumphalism. Exceptionalism refers to the belief that Western sciences, alone among all human knowledge systems, are capable of grasping reality in its own terms—“cutting nature at the joints,” as philosophers of science typically enjoy referring to the matter. Triumphalism names the assumption that the history of Western science consists of a narrative only of achievements; any claimed undesirable aspects are attributed to social and political projects, and Western sciences themselves make no contributions to such events and processes.

3. There are a number of reliable sources on their activities. Here I draw primarily on Goodenough 1996 and Watson-Verran and Turnbull 1995. See also Hutchins 1996.

4. Cultures of only oral literacy have a much richer literacy than do orally literate people who live in writing cultures.

5. There are notable exceptions to this claim. For example, Europeans seem not to have been ready to appropriate the numeral zero when they first encountered it. The numeral seems to have been invented independently in at least three different cultures. The field of ethnomathematics has begun to flourish in the last two decades. See, e.g., the relevant entries in Selin 2007.

6. The standard Western view is also suspect because it tends to hide important differences between various indigenous knowledge systems as well as between different modern Western sciences. Biology and physics differ in many respects, and so do non-Western sciences that are co-produced with different cultures and their religious systems, or that have varying degrees of hybridity with modern Western sciences. Both sides of this contrast are highly heterogeneous.

7. See Viveiros de Castro (2004) for an analysis of the mirror-image ontologies of modern Western sciences and indigenous knowledge systems, each of which is culturally anchored.

8. Kyle Powys Whyte (2013) shows how some of the diverse meanings of the similar term “traditional environmental knowledge” are used to direct environmental policy in ways that do not maximally protect the environment or respect what indigenous peoples know about and need from their environments. Thus, the choice of which term to use in such case has significant consequences. The different usages of such terms bring different benefits and costs to different social groups.

9. Recollect from chapter 1 President Truman’s 1949 inaugural speech, in which he argued for the West’s assistance in the improvement of the lot of the underdeveloped societies. This was to be accomplished through use of the West’s scientific rationality and technical expertise.

10. Some of the influential such writings are Gross and Levitt 1994; Gross, Levitt, and Lewis 1996; Kimball 1998; Ross 1996; and Sokol and Bricmont 1998. In the interest of full disclosure, my work has frequently been a target of these criticisms.

11. In addition to sources already cited, see Agrawal 1995; Hayden 2005; Hoppers 2002.

12. An earlier and less complete version of this section appears in Harding 2008, chapter 6.

13. This raises the controversial issue about whether “indigenous knowledge” must remain fixed in “traditional practices,” or may evolve to meet changing circumstances. I am writing as if the latter were always the case, as I think it factually is and as it ethically and politically must be. Yet the US federal government, with the support of competing interests, seems to insist on the former. For example, hunting from a car on tribal lands or preserving hunted game in a freezer for future use have both been contested by nonnative (white) hunters as disqualifying Native Americans for their federally guaranteed distinctive right to their own hunting seasons on their own tribal lands. This is so even when there are tribal ethical and cultural justifications for the “modern” practices (Reo and Whyte 2012).

14. Hint: Survey your students and friends about what family medical, health, and food practices they experienced in their childhood that were from “the old country” (perhaps other categories of knowledge are also relevant). Ask also which ones they continue to make use of now. This provides a fascinating and always entertaining class exercise!

CHAPTER FIVE

1. Another literature that starts off from women’s and Third World lives to follow other ways of producing knowledge is the feminist international relations literature. See, for example, Enloe 2013; Tickner and Blaney 2012, 2013; and Tickner 2014.

2. Of course science studies scholars have argued that the same is true for the familiar accounts of gravity and tectonic plates: they are co-produced by sciences and their societies (with “nature’s order” constraining what has appeared reasonable to modern societies).

3. Some of the influential such writings are Gross and Levitt 1994; Gross, Levitt, and Lewis 1996; Kimball 1998; Ross 1996; and Sokol and Bricmont 1998. In the interest of full disclosure, my work was frequently a target of those attacks.

4. For one valuable response to the science wars, see Hart 1996.

5. Two of the most influential of these early studies were *Laboratory Life*, Bruno Latour and Steve Woolgar’s (1979) account of the struggle of experimenters to produce reliable empirical claims in the Salk Laboratories at the University of California at San Diego, and *Beamtimes and Lifetimes*, Sharon Traweek’s (1988) comparative study of the culturally different social relations in Tokyo and Stanford that were necessary to produce high energy physics at linear accelerators.

6. See, for example, the opening chapters of Barnes 1977 and Bloor 1977.

7. See also the collection of papers on Reisch’s book that were originally presented at a Philosophy of Science Association meeting and to which Reisch responds (Douglas 2009).

8. In England the eminent socialist scientist and philosopher J. D. Bernal, along with colleagues such as Joseph Needham, constructed a philosophy of science in the 1930s that held that only a socialist science, such as the Soviet science of the day, could objectively grasp reality. Only such a science could lead society

out of the hideous capitalist social relations that were grounded in ignorance about nature and social relations and into democratic and economically productive socialist social relations for all. This “Bernalism” continued to identify science with democracy and socialism, and thus framed British socialist thinking for decades. As Gary Werskey (1988, 185–212) argues, Bernalism was full of contradictory assumptions which Bernal and many of his colleagues could not themselves recognize. Needham did object to Bernal’s “scientific opium” (his scientism), though he, too, saw the logic of science and of democracy as identical.

9. See, for example, the essays in Rose and Rose 1976.

10. To be sure, there are a few exceptions to these claims. Marxists continued to argue that science had never been “European,” and that from its beginnings it had been part of a world system of global science (e.g., Cohen 1996). Goonatilake 1998 is also somewhat an exception here.

11. A theory is an abstraction. Abstraction is both inevitable and a valuable process for every knowledge system. Yet it has the potential to impose the abstractor’s political assumptions and goals on every case of strangeness—untranslatable difference—that it encounters, as Sankarín Krishna (2001) has argued with respect to the mainstream concepts and theories of international relations (I thank Ann Tickner for drawing to my attention to this article). Again and again, liberal European political and scientific projects insisted on the inferior status of the “otherness” they encountered in their imperial and colonial endeavors. Their very ability to impose abstract principles and laws on phenomena they couldn’t understand was evidence to them of the moral rightness of their own imperial and colonial stance. Krishna takes up several significant moments in such processes. The Castillian Spanish conquistadors and their Jesuit priests in “New Spain” wrote the first dictionary for indigenous peoples of the Americas, fixing Castilian once and for all as the real “Spanish” language. James Mill wrote a multivolume history of India (in which he never set foot—a sign of his objectivity!). The influential canon in the field of English literature was created as a curriculum for Indian schools decades before it became adopted in England. Hugo Grotius’s founding concepts of international law consistently had in mind the European project of colonizing Africa. These practices have left the field of international relations deeply racist and other cultures incomprehensible in their own terms. Moreover, this a general problem with liberalism, Krishna argues. Is the same true for the field of mainstream philosophy of science?

12. “Bricolage,” as Helen Watson-Verran and David Turnbull (1995) had put the point.

CHAPTER SIX

1. We return to this issue later.

2. Recollect the discussion in chapter 1 of President Truman’s call for the transfer of scientific rationality and technical expertise to the underdeveloped societies of the world in order to bring them into modern prosperity and thereby render them unlikely to stir up the kinds of hideous conflicts that had been visible in World War II. Development policies were directed by the mid-twentieth century form of modernization theory.

3. As discussed in chapter 1.

4. My thanks to the two anonymous external reviewers of the manuscript for valuable questions about a number of issues raised in this chapter.

5. In the latter two cases, the statesmen had no thought about respecting the religions, because the people who adhered to them didn't count as citizens anyway.

6. I'm thinking about restrictions on birth control, on homosexuality, and on women's positions in families, churches, and in public life.

7. Of course not all practices of religious institutions are so admirable, in the United States or elsewhere. Patriarchal religions have been a major source of women's oppression. Moreover, today's institutionalized religions are only beginning to confront their own hideous histories of sexual assault on children. And, of course, from the Crusades (and earlier) to today's jihadist terrorists, religious excuses have been claimed to justify the imposition of death and destruction—and often genocide—on nonbelievers. Nothing said here is intended to deny the significance of such horrors.

8. To pursue this issue further, see, for example, Eisenstadt 2000; Harding 2008; Kellert et al. 2006; and Prakash 1999.

9. See Warwick Anderson's (2009) different but related analysis of alignments—shared vibes, as he calls them—between postcolonial theory and science and technology studies.

10. See also Seth 2009.

11. I have discussed this further in Harding 2008, chapter 7.

12. They are writing about modern Western sciences. This may not be the case for other cultures' theories of knowledge, as Jim Maffie has pointed out to me in conversation.

13. Daston and Galison's historicization of the concept of objectivity was discussed in chapter 2. The introduction of photography and other mechanical means of representing nature shifted objectivity away from the questions of being "true to nature" that had characterized the earlier drawings, paintings, and lithographs of natural objects as they appeared in, for example, atlases. Scientists always insisted that the illustrations that accompanied their descriptions were most carefully supervised by them to make sure that the artists didn't introduce features, for aesthetic or other reasons, that could damage the illustrations' ability to be "true to nature." But "mechanical objectivity" was valued because, it was claimed, it maximized the impersonal accuracy of representations by removing human hands from depictions of natural objects. The issue in the text here is the moral weight of "right sight," as Daston and Galison put the point.

14. Sands (2008) shows how this worked for nineteenth century US feminism.

15. Thanks to Suman Seth, in conversation, for improving my thinking here.

16. This was the conclusion of a recent lawsuit lodged against the University of California.

17. Thanks to one of the external reviewers for stimulating me to sharpen my argument here.

18. Recollect that chapter 5 provided strategies for avoiding not only a vicious relativism but also an indefensible and unnecessary scientific realism.

CHAPTER SEVEN

1. Recollect that the “logic” of standpoint theory and its methodology here refers to its everyday meaning as reasonableness. This is in contrast to the logical positivists’ distinctive way of rationally reconstructing scientific processes as the one, universally valid “logic of scientific inquiry.”

2. As noted in chapter 5, the skeptics, such as leftists, postcolonialists, and some antiracists, invoke on behalf of more reliable and socially progressive projects precisely the social categories that had such hideous effects in the middle of the last century. Stalinism invoked class categories in support of its hideous policies, and fascism invoked racial categories for equally horrible projects. It is especially hard for these defenders of value-free sciences and their philosophies to see how race and class could be invoked on behalf of more reliable and socially progressive research when it was just such categories that were used by the fascists and Stalinists to create some of the most horrifying and widespread death and destruction that the world has ever seen. Moreover, quite apart from this issue, today many scientists and philosophers still find the value-free stance for their knowledge claims the best way to counter proponents of creationism and intelligent design and skeptics about global warming. Appeal to value-free facts can be compelling in some contexts in ways that theoretical appeals to a new kind of objectivity often will not be.

3. This week, as I edit this manuscript, National Public Radio has reported surprise that a large and significant collection of meteorites were owned by the Vatican. The curator of the collection insisted to the interviewer that it was religious commitment that motivated Roman Catholic interests in further scientific research, such as that on these meteorites, as had been the case for many centuries.

4. The historical comment turns this into a circular argument: Science studies got the idea for the mutual support claim from the social justice movements, and their making the claim provides evidence for correctness of the social justice claim. Perhaps it is better to regard this as a recognition of how insights that appear original in a disciplinary context often may have arrived in that context through social histories that until this point have been external to the discipline’s intellectual history.

5. For criticisms of such misreading of feminist epistemology and philosophy of science, see Richardson 2010 and Rooney 2007, 2012.

6. I say “usually” because there are also tendencies in all of these movements for researchers to claim that they are simply following the existing rules of good research. There is nothing wrong with the standards for good research, they claim. It is simply the failure to follow those standards that has produced racism, sexism, etc. It was criticism of this spontaneous “feminist empiricism” that generated standpoint epistemology and methodology in the first place. Feminist philosophers subsequently developed what they called “feminist empiricism,” which conceptualized its project as refusing both this spontaneous position and standpoint theory. See, for example, Longino 1990, 1993, 2002; and Potter 2006.

7. See, e.g., Jean Bethke Elshtain, 593.

8. Think of the beautiful botanical prints that decorate hotel rooms (e.g., Reitsma n.d.).

9. One such challenge for teachers, for example, is that of working with students whose cultures' high respect for elders leaves them morally and psychologically uncomfortable with putting forth their own ideas in class discussions, producing critical analyses of text materials, or addressing professors in their graduate seminars (who will be their colleagues in a few years) by their first names.

10. See social psychologist Sandra Jochelovitch's (2007) rich argument for a conception of the knowing self that draws from many of the sources used in this chapter's analysis.

11. See Wolf 1996 for sophisticated reflections on the limitation of attempts in feminist research to realign knowledge and power relations in fieldwork.

12. "Up to that point" because early Western feminist assessments of such issues continued to perpetrate oppressive Eurocentric and racist practices until these, too, were identified and blocked—a process that has not yet reached completion!

13. We return to this issue below, in the section on "big science."

14. See also the responses to Cooke and Kothari's arguments in Hickey and Mohan 2004.

15. See also Fortmann 2008; Park et al. 1993; and Petras and Porpora 1993.

16. Watson and his co-creator Francis Crick were not quite as "lone" as Watson's account reports. It was only the theft from a neighboring laboratory of Rosalind Franklin's photographs that enabled them to imagine the design of DNA that they eventually provided (Hubbard 2003).

17. Note that the development of Cree goose hunting knowledge and Pacific Island navigating knowledge similarly required the preexistence and then reformation of communities and networks that interacted with each other to advance the growth of the kind of knowledge that each culture wanted.

18. Compare, for example, Beck 1997; Callon, Lascoumes, and Barthe 2001; Latour 2004; Maffie 2005; and Turnbull 2005. And see also the collaboration theorists in Colwell-Chanthaphonh and Ferguson 2008, and Fortmann 2008.

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