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AUTHOR'S NOTE: Words and phrases that I use in a technical sense are marked with an asterisk; for their definitions see the Glossary.

Lucifer is the chap who brings false light . . .
I am shrouding them in the darkness of truth.

—Lakatos to Feyerabend

CHAPTER ONE

"Do You Believe in Reality?"

News from the Trenches of the Science Wars

"I have a question for you," he said, taking out of his pocket a crumpled piece of paper on which he had scribbled a few key words. He took a breath: "Do you believe in reality?"

"But of course!" I laughed. "What a question! Is reality something we have to believe in?"

He had asked me to meet him for a private discussion in a place I found as bizarre as the question: by the lake near the chalet, in this strange imitation of a Swiss resort located in the tropical mountains of Teresopolis in Brazil. Has reality truly become something people have to believe in, I wondered, the answer to a serious question asked in a hushed and embarrassed tone? Is reality something like God, the topic of a confession reached after a long and intimate discussion? Are there people on earth who *don't* believe in reality?

When I noticed that he was relieved by my quick and laughing answer, I was even more baffled, since his relief proved clearly enough that he had anticipated a *negative* reply, something like "Of course not! Do you think I am that naive?" This was not a joke, then: he really was concerned, and his query had been in earnest.

"I have two more questions," he added, sounding more relaxed. "Do we know more than we used to?"

"But of course! A thousand times more!"

"But is science cumulative?" he continued with some anxiety, as if he did not want to be won over too fast.

"I guess so," I replied, "although I am less positive on this one, since the sciences also forget so much, so much of their past and so much of

their bygone research programs—but, on the whole, let's say yes. Why are you asking me these questions? Who do you think I am?"

I had to switch interpretations fast enough to comprehend both the monster he was seeing me as when he raised these questions and his touching openness of mind in daring to address such a monster privately. It must have taken courage for him to meet with one of these creatures that threatened, in his view, the whole establishment of science, one of these people from a mysterious field called "science studies," of which he had never before met a flesh-and-blood representative but which—at least so he had been told—was another threat to science in a country, America, where scientific inquiry had never had a completely secure foothold.

He was a highly respected psychologist, and we had both been invited by the Wenner-Grenn Foundation to a gathering made up of two-thirds scientists and one-third "science students." This division itself, announced by the organizers, baffled me. How could we be pitted *against* the scientists? That we are studying a subject matter does not mean that we are attacking it. Are biologists anti-life, astronomers anti-stars, immunologists anti-antibodies? Besides, I had taught for twenty years in scientific schools, I wrote regularly in scientific journals, I and my colleagues lived on contract research carried out on behalf of many groups of scientists in industry and in the academy. Was I not part of the French scientific establishment? I was a bit vexed to be excluded so casually. Of course I am just a philosopher, but what would my friends in science studies say? Most of them have been trained in the sciences, and several of them, at least, pride themselves on *extending* the scientific outlook to science itself. They could be labeled as members of another discipline or another subfield, but certainly not as "anti-scientists" meeting halfway with scientists, as if the two groups were opposing armies conferring under a flag of truce before returning to the battlefield!

I could not get over the strangeness of the question posed by this man I considered a colleague, yes, a colleague (and who has since become a good friend). If science studies has achieved anything, I thought, surely it has *added* reality to science, not withdrawn any from it. Instead of the stuffed scientists hanging on the walls of the armchair philosophers of science of the past, we have portrayed lively characters, immersed in their laboratories, full of passion, loaded with

instruments, steeped in know-how, closely connected to a larger and more vibrant milieu. Instead of the pale and bloodless objectivity of science, we have all shown, it seemed to me, that the many nonhumans mixed into our collective life through laboratory practice have a history, flexibility, culture, blood—in short, all the characteristics that were denied to them by the humanists on the other side of the campus. Indeed, I naively thought, if scientists have a faithful ally, it is we, the "science students" who have managed over the years to interest scores of literary folk in science and technology, readers who were convinced, until science studies came along, that "science does not think" as Heidegger, one of their masters, had said.

The psychologist's suspicion struck me as deeply unfair, since he did not seem to understand that in this guerrilla warfare being conducted in the no-man's-land between the "two cultures," *we were the ones* being attacked by militants, activists, sociologists, philosophers, and technophobes of all hues, precisely because of our interest in the inner workings of scientific facts. Who loves the sciences, I asked myself, more than this tiny scientific tribe that has learned to open up facts, machines, and theories with all their roots, blood vessels, networks, rhizomes, and tendrils? Who believes more in the objectivity of science than those who claim that it can be turned into an object of inquiry?

Then I realized that I was wrong. What I would call "adding realism to science" was actually seen, by the scientists at this gathering, as a threat to the calling of science, as a way of decreasing its stake in truth and their claims to certainty. How has this misunderstanding come about? How could I have lived long enough to be asked in all seriousness this incredible question: "Do you believe in reality?" The distance between what I thought we had achieved in science studies and what was implied by this question was so vast that I needed to retrace my steps a bit. And so this book was born.

The Strange Invention of an "Outside" World

There is no natural situation on earth in which someone could be led this strangest of all questions: "Do you believe in reality?" To ask such a question one has to become so *distant* from reality that the fear of *losing* it entirely becomes plausible—and this fear itself has an

intellectual history that should at least be sketched. Without this detour we would never be able to fathom the extent of the misunderstanding between my colleague and me, or to measure the extraordinary form of radical realism that science studies has been uncovering.

I remembered that my colleague's question was not so new. My compatriot Descartes had raised it against himself when asking how an isolated mind could be *absolutely* as opposed to relatively sure of anything about the outside world. Of course, he framed his question in a way that made it impossible to give the only reasonable answer, which we in science studies have slowly rediscovered three centuries later: that we are *relatively* sure of many of the things with which we are daily engaged through the practice of our laboratories. By Descartes's time this sturdy relativism*, based on the number of *relations* established with the world, was already in the past, a once-passable path now lost in a thicket of brambles. Descartes was asking for absolute certainty from a brain-in-a-vat, a certainty that was not needed when the brain (or the mind) was firmly attached to its body and the body thoroughly involved n its normal ecology. As in Curt Siodmak's novel *Donovan's Brain,* absolute certainty is the sort of neurotic fantasy that only a surgically removed mind would look for after it had lost everything else. Like a heart taken out of a young woman who has just died in an accident and soon to be transplanted into someone else's thorax thousands of miles away, Descartes's mind requires artificial life-support to keep it viable. Only a mind put in the strangest position, looking at a world *from the inside out* and linked to the outside by nothing but the tenuous connection of the *gaze,* will throb in the constant fear of losing reality; only such a bodiless observer will desperately look for some absolute life-supporting survival kit.

For Descartes the only route by which his mind-in-a-vat could reestablish some reasonably sure connection with the outside world was through God. My friend the psychologist was thus right to phrase his query using the same formula I had learned in Sunday school: "Do you believe in reality?"—"Credo in unum Deum," or rather, "Credo in unam realitam," as my friend Donna Haraway kept chanting in Teresopolis! After Descartes, however, many people thought that going through God to reach the world was a bit expensive and far fetched. They looked for a shortcut. They wondered whether the

world could *directly* send us enough information to produce a stable image of itself in our minds.

But in asking this question the empiricists kept going along the same path. They did not retrace their steps. They never plugged the wriggling and squiggling brain back into its withering body. They were still dealing with a mind looking through the gaze at a lost outside world. They simply tried to train it to recognize patterns. God was out, to be sure, but the *tabula rasa* of the empiricists was as disconnected as the mind in Descartes's times. The brain-in-a-vat simply exchanged one survival kit for another. Bombarded by a world reduced to meaningless stimuli, it was supposed to extract from these stimuli everything it needed to recompose the world's shapes and stories. The result was like a badly connected TV set, and no amount of tuning made this precursor of neural nets produce more than a fuzzy set of blurry lines, with white points falling like snow. No shape was recognizable. Absolute certainty was lost, so precarious were the connections of the senses to a world that was pushed ever further outside. There was too much static to get any clear picture.

The solution came, but in the form of a catastrophe from which we are only now beginning to extricate ourselves. Instead of retracing their steps and taking the other path at the forgotten fork in the road, philosophers abandoned even the claim to absolute certainty, and settled instead on a makeshift solution that preserved at least some access to an outside reality. Since the empiricists' associative neural net was unable to offer clear pictures of the lost world, this must prove, they said, that the mind (still in a vat) extracts *from itself* everything it needs to form shapes and stories. Everything, that is, except the reality itself. Instead of the fuzzy lines on the poorly tuned TV set, we got the fixed tuning grid, molding the confused static, dots, and lines of the empiricist channel into a steady picture held in place by the mind-at's predesigned categories. Kant's *a priori* started this extravagant form of constructivism, which neither Descartes, with his detour through God, nor Hume, with his shortcut to associated stimuli, would ever have dreamed of.

Now, with the Konigsberg broadcast, everything was ruled by the mind itself and reality came in simply to say that it was there, indeed, and not imaginary! For the banquet of reality, the mind provided the

food, and the inaccessible things-in-themselves to which the world had been reduced simply dropped by to say "We are here, what you eat is not dust," but otherwise remained mute and stoic guests. If we abandon absolute certainty, Kant said, we can at least retrieve universality as long as we remain inside the restricted sphere of science, to which the world outside contributes decisively but minimally. The rest of the quest for the absolute is to be found in morality, another *a priori* certainty that the mind-in-the-vat extracts from its own wiring. Under the name of a "Copernican Revolution"* Kant invented this science-fiction nightmare: the outside world now turns around the mind-in-the-vat, which dictates most of that world's laws, laws it has extracted from itself without help from anyone else. A crippled despot now ruled the world of reality. This philosophy was thought, strangely enough, to be the deepest of all, because it had at once managed to abandon the quest for absolute certainty and to retain it under the banner of "universal *a priori*s," a clever sleight of hand that hid the lost path even deeper in the thickets.

Do we really have to swallow these unsavory pellets of textbook philosophy to understand the psychologist's question? I am afraid so, because otherwise the innovations of science studies will remain invisible. The worst is yet to come. Kant had invented a form of constructivism in which the mind-in-the-vat built everything by itself but not entirely without constraints: what it learned from itself had to be universal and could be elicited only by some experiential contact with a reality out there, a reality reduced to its barest minimum, but there nonetheless. For Kant there was still something that revolved around the crippled despot, a green planet around this pathetic sun. It would not be long before people realized that this "transcendental Ego," as Kant named it, was a fiction, a line in the sand, a negotiating position in a complicated settlement to avoid the complete loss of the world or the complete abandonment of the quest for absolute certainty. It was soon replaced by a more reasonable candidate, *society**. Instead of a mythical Mind giving shape to reality, carving it, cutting it, ordering it, it was now the prejudices, categories, and paradigms of a group of people living together that determined the representations of every one of those people. This new definition, however, in spite of the use of the word "social," had only a superficial resemblance to

the realism to which we science students have become attached, and which I will outline over the course of this book.

First, this replacement of the despotic Ego with the sacred "society" did not retrace the philosophers' steps but went even *further* in distancing the individual's vision, now a "view of the world," from the definitely lost outside world. Between the two, society interposed its filters; its paraphernalia of biases, theories, cultures, traditions, and standpoints became an opaque window. Nothing of the world could pass through so many intermediaries and reach the individual mind. People were now locked not only into the prison of their own categories but into that of their social groups as well. Second, this "society" itself was just a series of minds-in-a-vat, many minds and many vats to be sure, but each of them still composed of that strangest of beasts: a detached mind gazing at an outside world. Some improvement! If prisoners were no longer in isolated cells, they were now confined to the same dormitory, the same collective mentality. Third, the next shift, from one Ego to multiple cultures, jeopardized the only good thing about Kant, that is, the universality of the *a priori* categories, the only bit of ersatz absolute certainty he had been able to retain. Everyone was not locked in the same prison any more; now there were *many* prisons, incommensurable, unconnected. Not only was the mind disconnected from the world, but each collective mind, each culture was disconnected from the others. More and more progress in a philosophy dreamed up, it seems, by prison wardens.

But there was a fourth reason, even more dramatic, even sadder, that made this shift to "society" a catastrophe following fast on the heels of the Kantian revolution. The claims to knowledge of all these poor minds, prisoners in their long rows of vats, were now made part of an even more bizarre history, were now associated with an even more ancient threat, *the fear of mob rule.* If my friend's voice quivered as he asked me "Do you believe in reality?" it was not only because he feared that all connection with the outside world might be lost, but above all because he worried that I might answer, "Reality depends on whatever the mob thinks is right at any given time." It is the resonance of these two fears, the *loss* of any certain access to reality and the *invasion* by the mob, that makes his question at once so unfair and so serious.

But before we disentangle this second threat, let me finish with the first one. The sad story, unfortunately, does not end here. However incredible it seems, it is possible to go even further along the wrong path, always thinking that a more radical solution will solve the problems accumulated from the past decision. One solution, or more exactly another clever sleight of hand, is to become so very pleased with the loss of absolute certainty and universal *a prioris* that one rejoices in abandoning them. Every defect of the former position is now taken to be its best quality. Yes, we have lost the world. Yes, we are forever prisoners of language. No, we will never regain certainty. No, we will never get beyond our biases. Yes, we will forever be stuck within our own selfish standpoint. Bravo! Encore! The prisoners are now gagging even those who ask them to look out their cell windows; they will "deconstruct," as they say—which means destroy in slow motion—anyone who reminds them that there was a time when they were free and when their language bore a connection with the world.

Who can avoid hearing the cry of despair that echoes deep down, carefully repressed, meticulously denied, in these paradoxical claims for a joyous, jubilant, free construction of narratives and stories by people forever in chains? But even if there *were* people who could say such things with a blissful and light heart (their existence is as uncertain to me as that of the Loch Ness monster, or, for that matter, as uncertain as that of the real world would be to these mythical creatures), how could we avoid noticing that we have not moved an inch since Descartes? That the mind is still in its vat, excised from the rest, disconnected, and contemplating (now with a blind gaze) the world (now lost in darkness) from the very same bubbling glassware? Such people may be able to smile smugly instead of trembling with fear, but they are still descending further and further along the spiraling curves of the same hell. At the end of this chapter we will meet these gloating prisoners again.

In our century, though, a second solution has been proposed, one that has occupied many bright minds. This solution consists of taking only a *part* of the mind out of the vat and then doing the obvious thing, that is, offering it a body again and putting the reassembled aggregate back into relation with a world that is no longer a spectacle at which we gaze but a lived, self evident, and unreflexive extension of ourselves. In appearance, the progress is immense, and the descent

into damnation suspended, since we no longer have a mind dealing with an outside world, but a lived world to which a semi-conscious and intentional body is now attached.

Unfortunately, however, in order to succeed, this emergency operation must chop the mind into even smaller pieces. The real world, the one known by science, is left entirely to itself. Phenomenology deals only with the world-for-a-human-consciousness. It will teach us a lot about how we never distance ourselves from what we see, how we never gaze at a distant spectacle, how we are always immersed in the world's rich and lived texture, but, alas, this knowledge will be of no use in accounting for how things really are, since we will never be able to escape from the narrow focus of human intentionality. Instead of exploring the ways we can shift from standpoint to standpoint, we will always be fixed in the human one. We will hear much talk about the real, fleshy, pre-reflexive lived world, but this will not be enough to cover the noise of the second ring of prison doors slamming even more tightly shut behind us. For all its claims to overcoming the distance between subject and object—as if this distinction were something that could be overcome! as if it had not been devised so as *not* to be overcome!—phenomenology leaves us with the most dramatic split in this whole sad story: a world of science left entirely to itself, entirely cold, absolutely inhuman; and a rich lived world of intentional stances entirely limited to humans, absolutely divorced from what things are in and for themselves. A slight pause on the way down before sliding even further in the same direction.

Why not choose the opposite solution and forget the mind-in-a-vat altogether? Why not let the "outside world" invade the scene, break the glassware, spill the bubbling liquid, and turn the mind into a brain, into a neuronal machine sitting inside a Darwinian animal struggling for its life? Would that not solve all the problems and reverse the fatal downward spiral? Instead of the complex "life-world" of the phenomenologists, why not study the adaptation of humans, as naturalists have studied all other aspects of "life"? If science can invade everything, it surely can put an end to Descartes's long-lasting fallacy and make the mind a wriggling and squiggling part of nature. This could certainly please my friend the psychologist—or would it? No, because the ingredients that make up this "nature," this hegemonic and all encompassing nature*, which would now include the human

species, are the *very same ones* that have constituted the spectacle of a world viewed from inside by a brain-in-a-vat. Inhuman, reductionist, causal, law-like, certain, objective, cold, unanimous, absolute—all these expressions do not pertain to nature *as such,* but to nature viewed through the deforming prism of the glass vessel!

If there is something unattainable, it is the dream of treating nature as a homogeneous unity in order to unify the different views the sciences have of it! This would require us to ignore too many controversies, too much history, too much unfinished business, too many loose ends. If phenomenology abandoned science to its destiny by limiting it to human intention, the opposite move, studying humans as "natural phenomena," would be even worse: it would abandon the rich and controversial human history of science—and for what? The averaged-out orthodoxy of a few neurophilosophers? A blind Darwinian process that would limit the mind's activity to a struggle for survival to "fit" with a reality whose true nature would escape us forever? No, no, we can surely do better, we can surely stop the downward slide and retrace our steps, retaining both the history of humans' involvement in the making of scientific facts and the sciences' involvement in the making of human history.

Unfortunately, we can't do this, not yet. We are prevented from returning to the lost crossroads and taking the other path by the dangerous bogeyman I mentioned earlier. It is the threat of mob rule that stops us, the same threat that made my friend's voice quake and quiver.

The Fear of Mob Rule

As I said, two fears lay behind my friend's strange question. The first one, the fear of a mind-in-a-vat losing its connection to a world outside, has a shorter history than the second, which stems from this truism: if reason does not rule, then mere force will take over. So great is this threat that any and every political expedient is used with impunity against those who are deemed to advocate force against reason. But where does this striking opposition between the camp of reason and the camp of force come from? It comes from an old and venerable debate, one that probably occurs in many places but that is staged most clearly and influentially in Plato's *Gorgias.* In this dialog, which I

will examine in more detail in Chapters 7 and 8, Socrates, the true scientist, confronts Callicles, another of those monsters who must be interviewed in order to expose their nonsense, this time not on the shores of a Brazilian lake but in the agora in Athens. He tells Callicles: "You've failed to notice *how much power geometrical equality has among gods and men,* and this neglect of geometry has led you to believe that one should try to gain a *disproportionate* share of things" (508a).[1]

Callicles is an expert at disproportion, no doubt about that. "I think," he boasts in a preview of Social Darwinism, "we only have to look at nature to find evidence that it is right for better to have a greater share than worse. . . The superior person shall dominate the inferior person and have more than him" (483c–d). Might makes Right, Callicles frankly admits. But, as we shall see at the end of this book, there is a little snag. As both of the two protagonists are quick to point out, there are at least two sorts of Mights to consider: that of Callicles and that of the Athenian mob. "What else do you think I've been saying?" Callicles asks. "Law consists of the statements made by an assembly of slaves and assorted other forms of human debris who could be completely *discounted if it weren't for the fact they do have physical strength at their disposal*" (489c). So the question is not simply the opposition of force and reason, Might and Right, but the Might of the solitary patrician against the superior force of the crowd. How can the combined forces of the people of Athens be nullified? "Here's your potion, then," Socrates ironizes: "a single clever person is almost bound to be *superior to ten thousand fools;* political power should be his and they should be his subjects; and it is appropriate for someone with political power to have more than his subjects" (490a). When Callicles speaks of brute force, what he means is an inherited moral force superior to that of ten thousand brutes.

But is it fair for Socrates to practice irony on Callicles? What sort of disproportion is Socrates himself setting in motion? What sort of power is he trying to wield? The Might that Socrates sides with is the *power of reason,* "the power of geometrical equality," the force which rules over gods and men," which he knows, which Callicles and the mob ignore. As we shall see, there is a second little snag here, because

1. I use the recent translation by Robin Waterfield (Oxford: Oxford University Press, 1994).

there are two forces of reason, one directed against Callicles, the ideal foil, and the other directed sideways, aimed at reversing the balance of power between Socrates and all the other Athenians. Socrates is also looking for a force able to nullify that of "ten thousand fools." He too tries to get the biggest share. His success at reversing the balance of forces is so extraordinary that he boasts, at the end of the *Gorgias,* of being "the only real statesman of Athens," the only winner of the biggest share of all, an eternity of glory that will be awarded to him by Rhadamantes, Aeacus, and Minos, who preside over the tribunal of hell! He ridicules all the famous Athenian politicians, Pericles included, and he alone, equipped with "the power of geometrical equality," will rule over the citizens of the city even beyond death. One of the first of many in the long literary history of mad scientists.

"As if your slapdash history of modern philosophy is not enough," the reader may complain, "do you also have to drag us all the way back to the Greeks just to account for the question asked by your psychologist in Brazil?" I am afraid both of these detours were necessary, because only now can the two threads, the two threats, be tied together to explain my friend's worries. Only after these digressions can my position, I hope, be clarified at last.

Why, in the first place, did we even need the idea of an *outside world* looked at through a gaze from the very uncomfortable observation post of a mind-in-a-vat? This has puzzled me ever since I started in the field of science studies almost twenty-five years ago. How could it be so important to maintain this awkward position, in spite of all the cramps it gave philosophers, instead of doing the obvious: retracing our steps, pruning back the brambles hiding the lost fork in the road, and firmly walking on the other, forgotten path? And why burden this solitary mind with the impossible task of finding absolute certainty instead of plugging it into the connections that would provide it with all the relative certainties it needed to know and to act? Why shout out of both sides of our mouths these two contradictory orders: "Be absolutely disconnected!" "Find absolute proof that you are connected!" Who could untangle such an impossible double bind? No wonder so many philosophers wound up in asylums. In order to justify such a self-inflicted, maniacal torture, we would have to be pursuing a loftier goal, and such indeed has been the case. This is the place where the two threads connect: it is in order to avoid the inhuman crowd that we

need to rely on another inhuman resource, the objective object untouched by human hands.

To avoid the threat of a mob rule that would make everything lowly, monstrous, and inhuman, we have to depend on something that has no human origin, no trace of humanity, something that is purely, blindly, and coldly outside of the City. The idea of a completely *outside* world dreamed up by epistemologists is the only way, in the eyes of moralists, to avoid falling prey to mob rule. *Only inhumanity will quash inhumanity.* But how is it possible to imagine an outside world? Has anyone ever seen such a bizarre oddity? No problem. We will make the world into a spectacle seen *from* the inside.

To obtain such a contrast, we will imagine that there is a mind-in-a-vat that is totally disconnected from the world and accesses it only through one narrow, artificial conduit. This minimal link, psychologists are confident, will be enough to keep the world outside, to keep the mind informed, provided we later manage to rig up some absolute means of getting certainty back—no mean feat, as it turns out. But this way we will achieve our overarching agenda: *to keep the crowds at bay.* It is because we want to fend off the irascible mob that we need a world that is totally outside—while remaining accessible!—and it is in order to reach this impossible goal that we came up with the extraordinary invention of a mind-in-a-vat disconnected from everything else, striving for absolute truth, and, alas, failing to get it. As we can see in Figure 1.1, *epistemology, morality, politics, and psychology go hand in hand and are aiming at the same settlement*.*

This is the argument of this book. It is also the reason the reality of science studies is so difficult to locate. Behind the cold epistemological question—can our representations capture with some certainty stable features of the world out there?—the second, more burning anxiety is always lurking: can we find a way to fend off the people? Conversely, behind any definition of the "social" is the same worry: will we still be able to use objective reality to shut the mob's too many mouths?

My friend's question, on the shore of the lake, shaded by the chalet's roof from the tropical noontime sun in this austral winter, becomes clear at last: "Do you believe in reality?" means "Are you willing to accept this settlement of epistemology, morality, politics, and psychology?" to which the quick and laughing answer is, obviously: of course not! Who do you think I am? How could I believe real

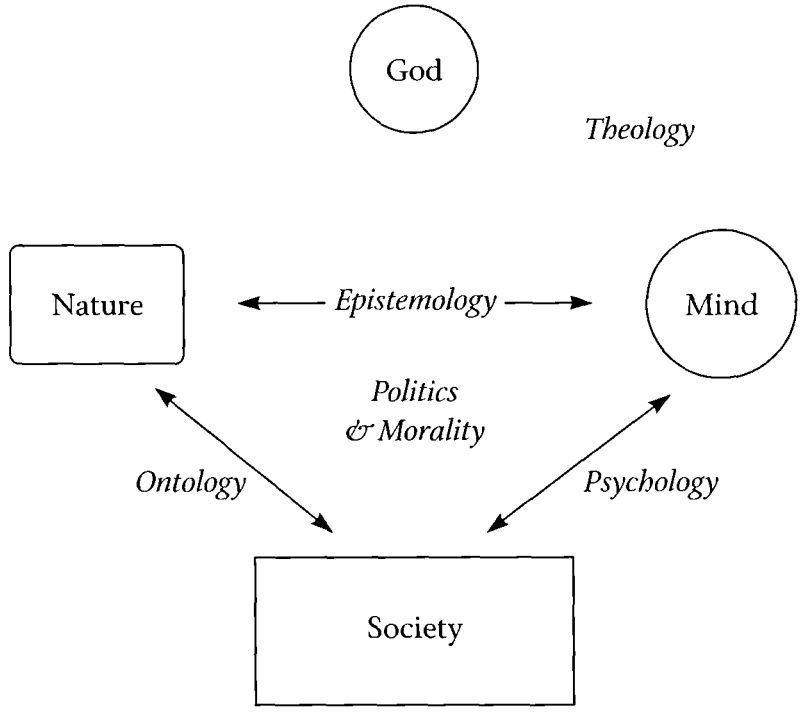

Figure 1.1 The modernist settlement. For science studies there is no sense in talking independently of epistemology, ontology, psychology, and politics—not to mention theology. In short: "out there," "nature"; "in there," the mind; "down there," the social; "up there," God. We do not claim that these spheres are cut off from one another, but rather that they all pertain to the same settlement, a settlement that can be replaced by several alternative ones.

ity to be the answer to a question of belief asked by a brain-in-a-vat terrified of losing contact with an outside world because it is even more terrified of being invaded by a social world stigmatized as inhuman?" Reality is an object of belief only for those who have started down this impossible cascade of settlements, always tumbling into a worse and more radical solution. Let them clean up their own mess and accept the responsibility for their own sins. My trajectory has always been different. "Let the dead bury the dead," and, please, listen for one minute to what we have to say on our own account, instead of trying to shut us up by putting in our mouths the words that Plato, all those centuries ago, placed in the mouths of Socrates and Callicles to keep the people silent.

Science studies, as I see it, has made two related discoveries that were very slow in coming because of the power of the settlement that I have now exposed—as well as for a few other reasons I will explain

later. This joint discovery is that *neither the object nor the social* has the *inhuman* character that Socrates' and Callicles' melodramatic show required. When we say there is no outside world, this does not mean that we deny its existence, but, on the contrary, that we refuse to grant it the ahistorical, isolated, inhuman, cold, objective existence that it was given *only* to combat the crowd. When we say that science is social, the word social for us does not bear the stigma of the "human debris," of the "unruly mob" that Socrates and Callicles were so quick to invoke in order to justify the search for a force strong enough to reverse the power of "ten thousand fools."

Neither of these two monstrous forms of inhumanity—the mob down there," the objective world "out there"—interests us very much. And thus we have no need for a mind- or brain-in-a-vat, that crippled despot constantly fearful of losing either "access" to the world or its "superior force" against the people. We long neither for the absolute certainty of a contact with the world nor for the absolute certainty of a transcendent force against the unruly mob. We do not *lack* certainty, because we never dreamed of *dominating* the people. For us, there is no inhumanity to be quashed with another inhumanity. Humans and nonhumans are enough for us. We do not need a social world to break the back of objective reality, nor an objective reality to silence the mob. It is quite simple, even though it may sound incredible in these times of the science wars: we are *not* at war.

As soon as we refuse to engage the scientific disciplines in this dispute about who should hold sway over the people, the lost crossroads is rediscovered, and there is no major difficulty in treading along the neglected path. Realism now returns in force, as will be made obvious, I hope, in later chapters, which should look like milestones along the route to a more "realistic realism." My argument in this book recapitulates the halting "two steps forward, one step back" advance of science studies along this long-forgotten pathway.

We started when we first began to talk about scientific *practice** and thus offered a more realistic account of science-in-the-making, grounding it firmly in laboratory sites, experiments, and groups of colleagues, as I do in Chapters 2 and 3. Facts, we found, were clearly fabricated. Then realism gushed forth again when, instead of talking about objects and objectivity, we began to speak of *nonhumans** that were socialized through the laboratory and with which scientists and engi

neers began to swap properties. In Chapter 4 we see how Pasteur makes his microbes while the microbes "make their Pasteur"; Chapter 6 offers a more general treatment of humans and nonhumans folding into each other, forming constantly changing collectives. Whereas objects had been made cold, asocial, and distant for political reasons, we found that nonhumans were close, hot, and easier to enroll and to enlist, adding more and more reality to the many struggles in which scientists and engineers had engaged.

But realism became even more abundant when nonhumans began to have a *history,* too, and were allowed the multiplicity of interpretations, the flexibility, the complexity that had been reserved, until then, for humans (see Chapter 5). Through a series of counter-Copernican revolutions*, Kant's nightmarish fantasy slowly lost its pervasive dominance over the philosophy of science. There was again a clear sense in which we could say that words have *reference* to the world and that science grasps the things themselves (see Chapters 2 and 4). Naïveté was back at last, a naïveté appropriate for those who had never understood how the world could be "outside" in the first place. We have yet to provide a real alternative to that fateful distinction between construction and reality; I attempt to provide one here with the notion of "factish." As we see in Chapter 9, "factish" is a combination of the words "fact" and "fetish," in which the work of fabrication has been twice added, canceling the twin effects of belief and knowledge.

Instead of the three poles—a reality "out there," a mind "in there," and a mob "down there"—we have finally arrived at a sense of what I call a *collective**. As the explication of the *Gorgias* in Chapters 7 and 8 demonstrates, Socrates has defined this collective very well before switching to his bellicose collusion with Callicles: "The expert's opinion is that co-operation, love, order, discipline, and justice *bind* heaven and earth, gods and men. That's why they call the universe an *ordered whole,* my friend, rather than a disorderly mess or an *unruly shambles*" (507e–508a).

Yes, we live in a hybrid world made up at once of gods, people, stars, electrons, nuclear plants, and markets, and it is our duty to turn it into either an "unruly shambles" or an "ordered whole," a *cosmos* as the Greek text puts it, undertaking what Isabelle Stengers gives the beautiful name of cosmopolitics* (Stengers 1996). Once there is no longer a mind in a vat looking through the gaze at an outside world,

the search for absolute certainty becomes less urgent, and thus there is no great difficulty in reconnecting with the relativism, the relations, the relativity on which the sciences have always thrived. Once the social realm no longer bears these stigmata branded upon it by those who want to silence the mob, there is no great difficulty in recognizing the human character of scientific practice, its lively history, its many connections with the rest of the collective. Realism comes back like blood through the many vessels now reattached by the clever hands of the surgeons—there is no longer any need for a survival kit. After following this route, no one would even think of asking the bizarre question "Do you believe in reality?"—at least not of asking *us!*

The Originality of Science Studies

Nevertheless, my friend the psychologist would still be entitled to pose another, more serious query: "Why is it that, in spite of what you claim your field has achieved, I was *tempted* to ask you my silly question *as if* it were a worthwhile one? Why is it that in spite of all these philosophies you zigzagged me through, I still doubt the radical realism you advocate? I can't avoid the nasty feeling that there is a science war going on. In the end, are you a friend of science or its enemy?"

Three different phenomena explain, to me at least, why the novelty of "science studies" cannot be registered so easily. The first is that we are situated, as I said, in the no-man's-land between the two cultures, much like the fields between the Siegfried and Maginot lines in which French and German soldiers grew cabbages and turnips during the "phony war" in 1940. Scientists always stomp around meetings talking about "bridging the two-culture gap," but when scores of people from outside the sciences begin to build just that bridge, they recoil in horror and want to impose the strangest of all gags on free speech since Socrates: only scientists should speak about science!

Just imagine if that slogan were generalized: only politicians should speak about politics, businessmen about business; or even worse: only rats will speak about rats, frogs about frogs, electrons about electrons! Speech implies by definition the risk of misunderstanding across the huge gaps between different species. If scientists want to bridge the two-culture divide for good, they will have to get used to a lot of noise and yes, more than a little bit of nonsense. After all, the humanists

and the literati do not make such a fuss about the many absurdities uttered by the team of scientists building the bridge from the other end. More seriously, bridging the gap cannot mean extending the unquestionable *results* of science in order to stop the "human debris" from behaving irrationally. Such an attempt can at best be called pedagogy, at worst propaganda. This cannot pass for the cosmopolitics that would require the collective to socialize into its midst the humans, the nonhumans, and the gods together. Bridging the two-culture gap cannot mean lending a helping hand to Socrates' and Plato's dreams of utter control.

But where does the two-culture debate itself originate? In a division of labor between the two sides of the campus. One camp deems the sciences accurate only when they have been purged of any contamination by subjectivity, politics, or passion; the other camp, spread out much more widely, deems humanity, morality, subjectivity, or rights worthwhile only when they have been protected from any contact with science, technology, and objectivity. We in science studies fight against these two purges, against both purifications at once, and this is what makes us traitors to both camps. We tell the scientists that *the more connected a science* is to the rest of the collective, *the better* it is, the more accurate, the more verifiable, the more solid (see Chapter 3)—and this runs against all the conditioned reflexes of epistemologists. When we tell them that the social world is good for science's health, they hear us as saying that Callicles' mobs are coming to ransack their laboratories.

But, against the other camp, we tell the humanists that *the more nonhumans share existence with humans, the more humane* a collective is—and this too runs against what they have been trained for years to believe. When we try to focus their attention on solid facts and hard mechanisms, when we say that objects are good for the subjects' health because objects have none of the inhuman characteristics they fear so much, they scream that the iron hand of objectivity is turning frail and pliable souls into reified machines. But we keep defecting and counter-defecting from both sides, and we insist and insist again that there is a social history of things and a "thingy" history of humans, but that neither "the social" nor "the objective world" plays the role assigned to it by Socrates and Callicles in their grotesque melodrama.

If anything, and here we can be rightly accused of a slight lack of

symmetry, "science students" fight the humanists who are trying to invent a human world purged of nonhumans *much more* than we combat the epistemologists who are trying to purify the sciences of any contamination by the social. Why? Because scientists spend only a fraction of their time purifying their sciences and, frankly, do not give a damn about the philosophers of science coming to their rescue, while the humanists spend all their time on and take very seriously the task of freeing the human subjects from the dangers of objectification and reification. Good scientists enlist in the science wars only in their spare time or when they are retired or have run out of grant money, but the others are up in arms day and night and even get granting agencies to join in their battle. This is what makes us so angry about the suspicion of our scientist colleagues. They don't seem to be able to differentiate friends from foes anymore. Some are pursuing the vain dream of an autonomous and isolated science, Socrates' way, while we are pointing out the very means they need to reconnect the facts to the realities without which the existence of the sciences cannot be sustained. Who first offered us this treasure trove of knowledge? The scientists themselves!

I find this blindness all the more bizarre because, in the last twenty years, many scientific disciplines have joined us, crowding into the tiny no man's-land between the two lines. This is the second reason "science studies" is so contentious. By mistake, it is caught in the middle of another dispute, this one *within* the sciences themselves. On one side there are what could be called the "cold war disciplines," which still look superficially like the Science of the past, autonomous and detached from the collective; on the other side there are strange imbroglios of politics, science, technology, markets, values, ethics, facts, which cannot easily be captured by the word Science with a capital S.

If there is some plausibility in the assertion that cosmology does not have the slightest connection with society—although even that is wrong, as Plato reminds us so tellingly—it is hard to say the same of neuropsychology, sociobiology, primatology, computer sciences, marketing, soil science, cryptology, genome mapping, or fuzzy logic, to name just a few of these active zones, a few of the "disorderly messes" Socrates would call them. On the one hand we have a model that still applies the earlier slogan the less connected a science the better while on the other we have many disciplines, uncertain of

their exact status, striving to apply the old model, unable to reinstate it, and not yet prepared to mutter something like what we have been saying all along: "Relax, calm down, the more connected a science is the better. Being part of a collective will not deprive you of the nonhumans you socialize so well. It will only deprive you of the polemical kind of objectivity that has no other use than as a weapon for waging a political war *against* politics."

To put it even more bluntly, science studies has become a hostage in a huge shift from Science to what we could call Research (or Science No. 2, as I will call it in Chapter 8). While Science had certainty, coldness, aloofness, objectivity, distance, and necessity, Research appears to have all the opposite characteristics: it is uncertain; open-ended; immersed in many lowly problems of money, instruments, and know-how; unable to differentiate as yet between hot and cold, subjective and objective, human and nonhuman. If Science thrived by behaving as if it were totally disconnected from the collective, Research is best seen as a *collective experimentation* about what humans and nonhumans together are able to swallow or to withstand. It seems to me that the second model is wiser than the former. No longer do we have to choose between Right and Might, because there is now a third party in the dispute, that is, the collective*; no longer do we have to decide between Science and Anti-Science, because here too there is a third party—*the same* third party, the collective.

Research is this zone into which humans and nonhumans are thrown, in which has been practiced, over the ages, the most extraordinary collective experiment to distinguish, in real time, between "cosmos" and "unruly shambles" with no one, neither the scientists nor the "science students," knowing in advance what the provisional answer will be. Maybe science studies is anti-Science, after all, but in that case it is wholeheartedly *for* Research, and, in the future, when the spirit of the times will have taken a firmer grip on public opinion, it will be in the same camp as all of the active scientists, leaving on the other side only a few disgruntled cold-war physicists still wishing to help Socrates shut the mouths of the "ten thousand fools" with an unquestionable and indisputable absolute truth coming from nowhere. The opposite of relativism, we should never forget, is called absolutism (Bloor [1976] 1991).

I am being a bit disingenuous, I know—because there is a third rea

son that makes it hard to believe that science studies could have so many goodies to offer. By an unfortunate coincidence, or maybe through a strange case of Darwinian mimicry in the ecology of the social sciences, or—who knows?—through some case of mutual contamination, science studies bears a superficial resemblance to those prisoners locked in their cells whom we left, a few pages ago, in their slow descent from Kant to hell and smiling smugly all the way down, since they claim no longer to care about the ability of language to refer to reality. When we talk about hybrids and imbroglios, mediations, practice, networks, relativism, relations, provisional answers, partial connections, humans and nonhumans, "disorderly messes," it may sound as if we, too, are marching along the same path, in a hurried flight from truth and reason, fragmenting into ever smaller pieces the categories that keep the human mind forever removed from the presence of reality. And yet—there is no need to paper it over—just as there is a fight inside the scientific disciplines between the model of Science and the model of Research, there is a fight in the social sciences and the humanities between two opposite models, one that can loosely be called postmodern* and the other that I have called nonmodern*. Everything the first takes to be a justification for more absence, more debunking, more negation, more deconstruction, the second takes as a proof of presence, deployment, affirmation, and construction.

The cause of the radical differences as well as of the passing resemblances is not difficult to ferret out. Postmodernism, as the name indicates, is descended from the series of settlements that have defined modernity. It has inherited from these the disconnected mind-in-the-it's quest for absolute truth, the debate between Might and Right, the radical distinction between science and politics, Kant's constructivism, and the critical urge that goes with it, but it has *stopped* believing it is possible to carry out this implausible program successfully. In this disappointment it shows good common sense, and that is something to say in its favor. But it has not retraced the path of modernity all the way back to the various bifurcations that started this impossible project in the first place. It feels the same nostalgia as modernism, except that it tries to take on, as positive features, the overwhelming failures of the rationalist project. Hence its apology on behalf of Callicles and the Sophists, its rejoicing in virtual reality, its debunking of "master narratives," its claim that it is good to be stuck

inside one's own standpoint, its overemphasis on reflexivity, its maddening efforts to write texts that do not carry any risk of presence.

Science studies, as I see it, has been engaged in a very different nonmodern task. For us, modernity has never been the order of the day. Reality and morality have never been lacking. The fight for or against absolute truth, for or against multiple standpoints, for or against social construction, for or against presence, has never been the important one. The program of debunking, exposing, avoiding being taken in, steals energy from the task that has always seemed much more important to the collective of people, things, and gods, namely, the task of sorting out the "cosmos" from an "unruly shambles." We are aiming at a *politics of things,* not at the bygone dispute about whether or not words refer to the world. Of course they do! You might as well ask me if I believe in Mom and apple pie or, for that matter, if I believe in reality!

Are you still unconvinced, my friend? Still uncertain if we are fish or fowl, friends or foes? I must confess that it takes more than a small act of faith to accept this portrayal of our work in such a light, but since you asked your question with such an open mind, I thought you deserved to be answered with the same frankness. It is true that it is a bit difficult to locate us in the middle of the two-culture divide, in the midst of the epochal shift from Science to Research, torn between the postmodern and the nonmodern predicament. I hope you are convinced, at least, that there is no deliberate obfuscation in our position, but that being faithful to your own scientific work in these troubled times is just damned difficult. In my view, your work and that of your many colleagues, your effort to establish facts, has been taken hostage in a tired old dispute about how best to control the people. We believe the sciences deserve better than this kidnapping by Science.

Contrary to what you may have thought when you asked me for this private conversation, far from being the ones who have limited science to "mere social construction" by the frantic disorderly mob invented to satisfy Callicles' and Socrates' urge for power, we in science studies may be *the first to have found a way to free the sciences from politics*—the politics of reason, that old settlement among epistemology, morality, psychology, and theology. We may be the first to have freed nonhumans from the politics of objectivity and humans from the politics of subjectification. The disciplines themselves, the facts and the arti

facts with their beautiful roots, their delicate articulations, their many tendrils, and their fragile networks remain, for the most part, to be investigated and described. I try my best, in the pages that follow, to untangle a few of them. Far from the rumblings of the science wars in which neither you nor I want to fight (well, maybe I won't mind firing a few shots!), facts and artifacts can be part of many other conversations, much less bellicose, much more productive, and, yes, much friendlier.

I have to admit I am being disingenuous again. In opening the black box of scientific facts, we knew we would be opening Pandora's box. There was no way to avoid it. It was tightly sealed as long as it remained in the two-culture no-man's-land, buried among the cabbages and the turnips, blissfully ignored by the humanists trying to avoid all the dangers of objectification and by the epistemologists trying to fend off all the ills carried by the unruly mob. Now that it has been opened, with plagues and curses, sins and ills whirling around, there is only one thing to do, and that is to go even deeper, all the way down into the almost-empty box, in order to retrieve what, according to the venerable legend, has been left at the bottom—yes, *hope*. It is much too deep for me on my own; are you willing to help me reach it? May I give you a hand?