"Do you believe in reality?" —news from the trenches of the Science Wars

Bruno Latour

Foreword of **Pandora's Hope**

"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 in his 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 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 placed in the tropical mountains **of Teresopolis**, in Brazil. "Has reality really become something people have to believe in," I thought to myself, "the answer to a serious question raised in a hushed and embarassed tone? Is reality something like God, the topic for a confession reached after a long and intimate discussion? Are there people on earth who don't believe in reality?"

When I noticed 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 believe me to be so naive?". Then this was not a joke; he really was concerned and his query had been put in earnest. "I have two more questions," he added in a more relaxed tone, "do we know more than we used to?". "But of course, who do you think I am? 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 would be 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 did you think you were meeting with?". I had to switch interpretations fast enough to grasp both the monster he was seeing me as when raising these questions and the touching openness of mind he demonstrated in daring to address such a monster privately. It must have taken courage for him to meet directly 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 met a flesh-and-blood representative but which —at least this is what he

had been told— was another threat to science in a country, America, where scientific enquiry never had a completely secure foothold.

He was a psychologist of high repute and we had both been invited **by the Wenner-Grenn Foundation** to a meeting made up of two thirds scientists and one third "science students". Just by itself, this division 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 have taught for twenty years in scientific schools, I write regularly in scientific journals, I and my colleagues live on contract research carried out on behalf of many groups of scientists in industry and in the academy at the French and at the European level. Was I not part of the French scientific establishment? I was a bit vexed to be thrown out of the fold so lightly. Of course I am just a philosopher, but what should 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 labelled as members of another discipline or another subfield, but certainly not as "anti-scientists" meeting halfway with scientists, as if we were Indians encountering the cow-boys in a wigwam in a last resort negotiation before taking up the warpath again!

I could not get over the strangeness of the question posed by this man I considered as a colleague, yes, a colleague, and who has since become a good friend. If science studies have collectively achieved something, I thought, it must be that they have added reality to science, surely 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, connected through many vessels 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 non-humans 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 campus. Indeed, I naively thought, if scientists have a faithful ally, it is us, the "science students" who have managed over the years to interest scores of litterary folks 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 suspicion of this psychologist struck me as being deeply unfair, since he did not seem to understand that in this guerilla warfare going on in the no-man's-land between the "two-cultures", we were the ones being attacked by militants, activitists, sociologists, philosophers, technophobes of all shades and 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 which has learned to unfold 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 called "adding realism to science" was really seen, by the scientists at this meeting, as a threat to the calling of science, as a way of decreasing its stake to truth and of their claims to certainty. How has this misunderstanding come about? How could have I lived long

enough to be asked in earnest 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 the question put to me was so huge that I needed to retrace my steps a little bit. Such is the origin of the present book.

The strange invention of an "outside" world

There is no natural situation on earth in which someone could be asked this strangest of all questions: "Do you believe in reality?" One has to become so distant from reality that the threat of entirely losing it becomes plausible, and this fear itself has an intellectual history that should at least be sketched. Without this detour we will never be able to fathom the extent of the misunderstanding between me and my colleague, or to measure up the extraordinary form of radical realism that science studies has been unearthing.

I remembered that my friend's question was not so new. My compatriot Descartes had raised it against himself when asking how could an isolated mind be absolutely and not relatively sure of anything about the outside world. Of course, his question was framed in such a way that it was already impossible to answer it with 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' time, this sturdy relativism*[1], based on the number of relations established with the world, was already something of the past, a once-viable embranchment now lost in a thicket of brambles. He was asking for absolute certainty from a brain-in-a-vat that was not needed when the brain (or the mind) was firmly attached to its body and the body solidly entangled in its normal ecology. **As in the novel by Curt Siodmak Donovan's Brain**, absolute certainty is the sort of neurotic fantasy that only a surgically removed mind would look for after it has lost everything else. Like a heart taken out of a young woman who has just died in an accident and which is to be transplanted into someone else's thorax thousands of miles away, Descartes' mind requires an artificial life support if it is to keep beating all the way through. 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 most 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 detour which would allow his mind-in-a-vat to reestablish some reasonably sure connection with the outside world was God. My friend the psychologist was thus right to phrase his query by using the same formula as 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 tried to see whether the world could not

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[1] When I use a word or an expression in a technical sense, I have added an asterisk and the definitions can be found in the glossary at the end.

directly send us enough information to produce in our mind a stable image of itself. But in asking this question, the empiricists kept going along the same path. They did not retrace their steps. They never plugged the wiggling 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 to recognize patterns. God was out, to be sure, but the *tabula rasa* of the empiricists was as disconnected as the mind in Descartes' 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 out of these everything that was needed to recompose its shapes and stories. The result was like a badly connected TV set and no amount of tuning made this precursor of neural nets give more than a fuzzy set of blurry lines, with white points falling like snow. No shape seemed 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 offered by the forgotten fork in the road, philosophers abandoned forever even the claim to absolute certainty, and settled down instead on a make-do 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, it must be the proof, they said, that the mind (still in a vat) extracts from itself all that is needed to form shapes and stories. Everything, that is, except the reality itself. Instead of the snow falling from the out of tune TV set, we got the fixed tuning grid., forming the confused static, dots and lines of the empiricist channel into a steady picture held in place by the mind set's predesigned category. Kant's *a priori* started this extravagant form of constructivism that neither Descartes, with his detour through God, nor Hume with his shortcut to associated stimuli, would have ever 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 made up! For the banquet of reality, the mind provided the food, and the world, now reduced to inacessible things-in-themselves, simply came to say "we are here, what you eat is not dust", but otherwise they remained mute and stoic guests. If we abandon absolute certainty, Kant said, we can retrieve at least 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 of 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 "Copernican Revolution*", Kant invented this science-fiction nightmare: the world outside now turns around the mind-in-the-vat, which dictates most of its laws, laws which it has extracted from itself with no help from any one else. A crippled despot now ruled the world of reality. This philosophy passed, strangely enough, for the deepest of all, because it had at once managed to abandon the quest for absolute certainty, while **retaining it** under the banner of "universal *a prioris*", a clever sleight-of-hand that should have made the whole sham visible at last, but that, on the contrary, hid the lost branching even deeper in the thickets.

Do we really have to swallow these pellets of textbook philosophy to understand my psychologist friend's query? I am afraid so, **because the**

innovations of science studies will remain invisible without it. 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 completely without constraints; what it learned from itself had to be universal and could be elicited only through some experiential contact with a reality out there, reduced to its barest minimum, but there nonetheless. For Kant, there was stil something that turned around the crippled despot, a green planet around this pathetic sun. It could 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 the frames 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 which determined the representations of every one of them. This move, however, in spite of the use of the word "social", had only the appearance of the realism we, science students, have become attached to, which will be outlined 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. In between the two, society interposed its filters; its paraphernalia of biases, theories, cultures, tradition and standpoints ended up as an opaque window. Nothing of the world could now pass through so many intermediaries and reach the individual mind. People were now not only locked 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, lots of minds and lots of vats to be sure, but each of them still made out of the most strange beast: a detached mind gazing at an outside world. Great improvement indeed! 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 had jeopardized the only good thing about Kant, that is, the universality of the *a priori* categories, the only bit of *erzatz* absolute certainty he had been able to **retain**. Every one 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 other! More and more progress in a philosophy dreamed up, it seems, by prison bosses..$$JT.

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 knowledge claims 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 even more ancient and venerable threat, the fear of mob rule. If my friend's voice quivered in asking me his question "Do you believe in reality?", it is not only because of the fear that all connection with the outside world might be lost, but above all because he worried I might answer: "It is in the hands of 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. No matter how incredible it seems, it is possible to carry on even further along the wrong path, always thinking that a more radical solution will end up solving the accumulated mistakes of 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 their abandonment. Every defect of the former position is now taken to be its greatest quality. Yes, we have lost the world. Yes we are forever prisoners of language. No, we will never get certainty back. No, we will never get beyond our biases. Yes, we will remain forever stuck within the narrow blinders of our own selfish standpoint. *Bravo! Encore!* The prisoners are now gagging even those who ask them to look out of their window cells; 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 for 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 standpoint of the very same bubbling glassware? They can 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 grimacing (rire jaune$$) 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 <u>part of</u> 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 had to chop the mind into even smaller pieces. The real world, the one known by science is entirely abandoned 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 fastened down into the human one. We will hear lots of talk about the real, fleshy, pre-reflexive lived world, but this will not be enough to cover the noise made as the second ring of prison doors slam shut behind us even more tightly. For all its claims to overcome the distance between subject and object —as if this

distinction was 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 take the opposite solution and forget the mind-in-the-vat altogether? Why not let the "outside world" invade the whole 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 of the problems and reverse the fatal spiral downward? 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' long lasting fallacy and make the mind a wiggling and squiggling part of nature. This would 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 *per se*, 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, and would abandon the rich and controversial human history of science for what? The averaged out orthodoxy of a few neurophilosophers? A blind darwinian process which would limit the mind's activity to a struggle for survival to "fit" with a reality the true nature of which would escape us for ever? No, no, we can surely do better, we can surely stop the slide downward and retrace our steps for good, retaining both the history of humans' involvment in the making of scientific facts, as well as the science's involvment in the making of human history..

Unfortunately we can't, not yet, we are prevented from returning to the lost crossroads and taking the other path by the dangerous bogey-man 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 mentioned, two fears were at the root of 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 the truism: if reason does not rule, then mere force will take over. So great is this threat that any and every political expedient can be 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, probably going on in many places, but which is staged clearly and influentially in Plato's Gorgias. In this dialog, which I will examine in much greater 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 Athen's agora.

> "In fact 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" (508 a)

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" (483 d). Might is Right, Callicles frankly admits. But, as we will see at great length at the end of this book, there is a little snag. As the two protagonists are both 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 am 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?" (489 c). 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 Athen be nullified? "Here's your position 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" (490 a). When Callicles speaks of brute force, what he means is a moral inherited force superior to that of ten thousand brutes.

Is it fair for Socrates, though, to practice irony on Callicles? What sort of disproportion is he himself setting in motion? What sort of power is he trying to handle? The force 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 will see, here is a second little snag, because there are two forces of reason, first the one directed against Callicles, the ideal foil, and the other one, directed sideways, aimed at reversing the balance of power between him, Socrates, and all the other Athenians. Socrates is also looking for a force able to nullify that of "ten thousands fools". He too tries to get the biggest share. His success at reversing the balance of force 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 of the famous Athenian politicians, Pericles included, and he alone, equipped with "the power of geometrical equality", will rule even beyond death over the citizens of the city. One of the first of many in the long litterary history of mad scientists...

"As if your slapdash history of modern philosophy was not enough," the reader might complain, "do we also have to be dragged all the way back to the

Greeks just to account for the question of your psychologist in Brazil?" I am afraid that 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, hopefully, 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 is what has always puzzled me 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: retrace our steps, clean up the brambles hiding the lost fork in the road, and firmly walk on the other path at the forgotten crossroad? Why, in addition, burden this solitary mind with the impossible load of finding absolute certainty instead of plugging it into the connections that would have provided it with all the relative certainties it needed to know and act? Why shout out of both sides of our mouth these two contradictory orders: "Be absolutely disconnected!"; "Find absolute proof that you are connected!"? Who would have resisted such an impossible double bind? No wonder so many philosophers wound up in an asylum. In order to justify such a self-inflicted, maniacal torture, you would have to be pursuing a higher and more loftly 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 you 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, you 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 the mob rule. Only inhumanity will quash inhumanity. But how is it possible to imagine an outside world? Has anyone 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 totally disconnected from the world and which accesses it through only 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 feast it turned 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 this extraordinary invention of a mind-in-a-vat disconnected from everything else, striving for absolute truth, and, alas, failing to get it... Epistemology, morality, politics and psychology go hand in hand and are aiming at the same settlement*. Such is the argument of this book. It is also the reason that the reality of science studies is so difficult to locate. Behind the cold epistemological question —can our representation 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 keep the people off limits? Conversely, behind any definition of the "social", the same worry is always itching: will we still be able to use objective reality to shut their too many mouths?

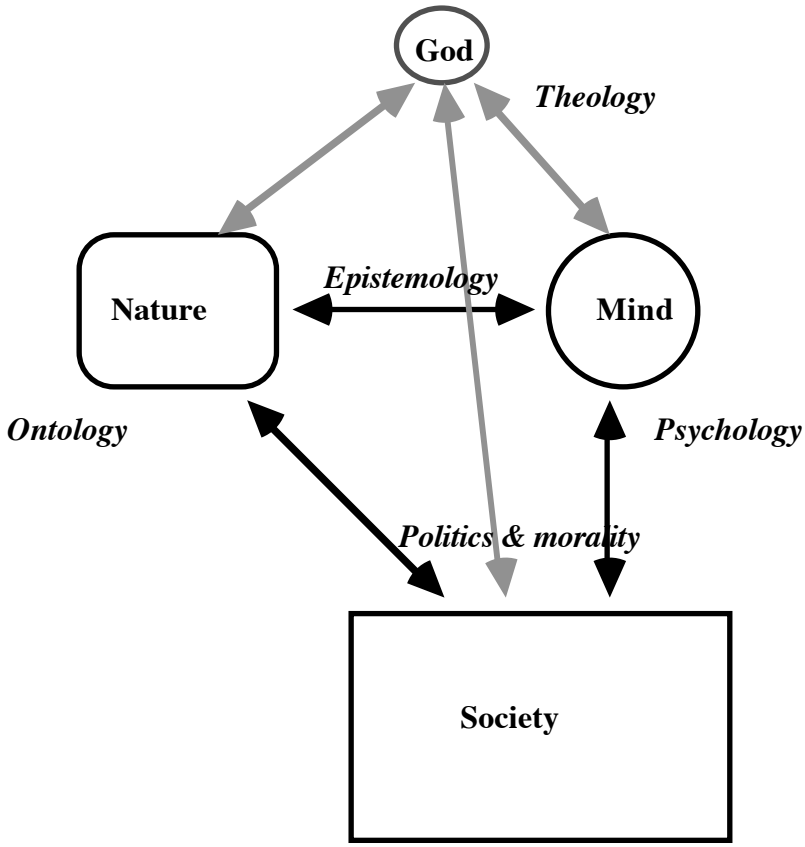

Figure 1-1 The modernist settlement. For science studies, however, there is no sense in talking independently of epistemology, ontology, psychology and politics —not to mention theology. We do not claim that these spheres are cut off from one another, but rather, that they all pertain to the same settlement, a settlement that can be replaced by several alternate others.$$JTadd sentences

My friend's question, on the shore of the lake, under the protection offered by the chalet's roof against 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: "No! Of course not, who do you think I am? How could I believe reality to be the answer to a question of belief, raised by a brain-in-a-vat terrified at the idea that it might lose contact with a world outside because it is even more terrified of being invaded by a social world stigmatised 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 take the burden of 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 shup us up by placing in our mouths the words that Plato, all these centuries ago, put 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 making themselves felt because of the sway that the settlement I have now exposed, I hope, clearly enough, has held over us —as well as for a few other reasons I will explain later in the book. This joint discovery is that neither the object nor the social have the inhuman character that the others' melodramatic show required. When we say that 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 beat the crowd down. 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 add in order to justify the search for a a force strong enough to reverse the power of "ten thousands 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 either for a mind or a brain-in-a-vat, for this 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 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 non-humans are enough for us. We do not need a social world to break the neck of objective reality, nor an objective reality to silence the mob. It is quite simple, even though it might sound incredible in these times of science wars: we are not at war.

As soon as we refuse to engage the scientific disciplines in this dispute over who should have sway over the people, the lost crossroads is cleared up, and there is no major difficulty in trodding along the other neglected path. Realism now comes back aplenty, as will be made obvious, I hope, in the chapters of this volume, which should look like milestones along the route to a more "realistic realism". The argument of this book recapitulates the circuitous "two step forward, one step back" advance of science studies along this 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 is done here 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 non-humans* socialized through the laboratory and with whom scientists and engineers began to swap properties. In chapter four, we see how Pasteur makes his microbes while the microbes "make their Pasteur, and chater 6 offers a more general treatment of humans and non-humans folding into each other, **to form** constantly changing collectives. Whereas objects had been made cold, asocial, and distant for political reasons, we found that non-humans were close, hot, and easier to enrol and to enlist, adding more and more reality to the many struggles in which the scientists and engineers had engaged themselves. But realism became even more abundant when non-humans began to have a history too, and were allowed the multiplicity of interpretations, the flexibility, the complexity that had been reserved, until then, to the human subjects uncovering them (see chapter 5). Through a series of counter-copernican revolutions*, Kant's nightmarish fantasy slowly lost its pervasive sway over the philosophy of science. There was again a clear sense in which we could say that words have reference to

the world and science grasps the things themselves, as the arguments of chapters 2 and 4 make clear. Naivety was back at last, one appropriate for those who had never understood how the world could be "outside" in the first place. **Of course, this meant, to return to that fateful distinction between construction and reality, to provide, with the notion of "factish" a real alternative to the construction versus nonconstruction argument. As we will see in chapter 9, factish is a combination of the words fact and fetish, in which the work of fabrication has been twice added, cancelling 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 finally arrived at a sense of what I will call a collective. As the explication of the Gorgias in chapter 7 and 8 demonstrates, Socrates has defined this collective very well before switching to his bellicose conspiration with Callicles:

> "The expert's opinion is that cooperation, 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."

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 into an "ordered whole", a *cosmos* as the Greek text puts in, undertaking what Isabelle Stengers gives the beautiful name of "cosmopolitics*" {Stengers, 1996 #2847} . Once there is no longer a mind-in-a-vat looking through the gaze at an outside world, the search for an absolute certainty becomes less urgent, and thus there is no great difficulty in reconnecting with the relativism, the relations, the relativity that the sciences have always thrived on. Once the social realm no longer bears these stigmata branded upon them 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 joined up again by the clever hand of the surgeons —there is no need for a survival kit any longer. After following this route, no one would even think of asking the bizarre question: "Do you believe in reality?"— at least not to us!

The originality of science studies

Nevertheless, my friend the psychologist would be entitled to make another and more serious query: "Why is it that, in spite of what you claim that 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 zig-zagged me through, I still doubt the radical realism you advocate? I can't help having the nasty feeling that there is a science war going on. I don't want to be lulled into passivity too fast. In the end, are you a friend of science or its enemy?"

Three different phenomena explain, in my eyes 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 in which French and German soldiers grew cabbages and turnips during the "phony war" between the Siegfried and Maginot lines in 1940. Scientists always

stomp around meetings speaking 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 shall 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 running the risk of misunderstanding over the huge gaps between different species. If scientists want to bridge the two culture divide for good, they have to get used to a lot of noise and, yes, more than a fair share of nonsense. After all, the humanists and *litterati* do not make so much 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 everywhere 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 non-humans and the gods all 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 come from? From a division of labor between the two sides of 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 to be worthwhile only when they have been protected from any contact with science, technology and objectivity. We in science studies fight against the 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 of 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 non-humans share existence with humans, the more humane a collective is, and this too runs against what they have been trained for years to bite at. When we try to focus their attention on solid facts and hard mecanisms, 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 between 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" occupy the roles given to them by Socrates and Callicles in their grotesque melodrama.

If anything, and here we can be rightly accused of a small lack of symmetry, "science students" fight the humanists trying to invent a human world purged of non-humans, much more than we combat the epistemologists trying to purify the sciences from 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 for the philosophers of science coming to their rescue, while the humanists

spend all of their time on and take very seriously the task of freeing the human subjects from the dangers of objectivation and reification. Good scientists enroll 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 wage their battle further and deeper... 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 any longer. Some are pursuing the vain dream of an autonomous and isolated science, Socrates' way, while we are pointing out to them the very means they need to reconnect the facts to the realities without which the existence of the sciences cannot be sustained for more than a moment. Who first offered us this treasure of lore? The scientists themselves!

I find this blindness all the more bizarre, since, in the last twenty years, many scientific disciplines have joined us, crowding even more the tiny no-man's-land between the two lines! This is the second reason that "science studies" is so contentious. By mistake, it is caught in the middle of another dispute going on, this time inside the sciences themselves. On the one hand, 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, and, on the other hand, there exist very strange imbroglios of politics, science, technology, market, values, ethics, facts, the shape of which cannot easily be captured by the word Science with a capital S. If there was some plausibility in saying 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, fuzzy logic, to name just a few of these active zones, a few of the "disorderly messes" as 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 which do not yet want to mutter something like what we have been saying all along: "Relax, quiet down, the more connected a science is the better; being in the midst of a collective will not deprive you of the non-humans you socialize so well and so efficiently. It will only deprive you of the polemical kind of objectivity which has no other content than as a weapon for waging a political war against politics".

To say it even more bluntly, science studies has become hostage in a huge shift from Science to what we could call Research (or science n°2 as we will call it in chapter 8) . While Science had all the characteristics of 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, know-how, unable to differentiate yet between hot and cold, subjective and objective, human and non-human. If Science thrived best by behaving as if it were totally disconnected from the collective, Research is best seen as a collective experimentation about what humans and non-humans 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 a third party in the dispute, that is, the collective*; no longer do we have to decide between Science and Anti-science, because, here again, there exists a third party, the same party, that is, again the collective.

Research is this zone into which humans and non-humans are thrown, the melting pot in which has been practiced, over the ages, the most extraordinary collective experiment to distinguish, in real time, between "cosmos" and "unruly shambles" without anyone, 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 whole-heartedly for Research, and, in the long run, 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.

I am a being bit disingenuous, I know, because there is a third reason that really 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 that 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 non-human, "disorderly messes", it could sound as if we, too, were 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, in the same way as there is a fight inside the scientific disciplines between the model of Science and the model of Research, there is a fight going on in the social sciences and the humanities between two opposite models, one that could loosely be called Postmodern* and the other that I have called Non-modern*. 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, descends from the series of settlements that have defined modernity. It has inherited from these the disconnected mind-in-the-vat's quest for absolute truth, the debate between Might and Right, the radical distinction between science and politics, Kant's constructivism and the crtical urge that goes with it, but it has stopped believing it was possible to carry out successfully this implausible program. In this disappointment, it shows good common sense and that 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 shares the same nostalgia as modernism, except that it tries to take on [surassumer$$], as so many 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, at least in the

way I see it, has been engaged in a very different non-modern 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 to debunk, to expose, to avoid being taken in, steals the energy from the one that has always seemed much more important to the collective of people, things and gods, namely, that of sorting out the "cosmos" out from "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 needs 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 little 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 non-modern predicament. I hope you are convinced, at least, that there is no deliberate obfuscation in our position, but simply that being faithful to your own scientific work in these troubled times is just damn difficult. In my view, your work and that of your many colleagues at establishing facts has been taken hostage in a tired old dispute about how best to control the people. We think that the sciences deserve better than this kidnapping by Science.

Contrary to what you might have thought in asking me for this private hearing, 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 might, on the contrary, be the first ones that have finally found a way to free the sciences from politics, the politics of reason, that old settlement between epistemology, morality, psychology and theology. We might be the first to have freed the non-humans from the politics of objectivity and the humans from the politics of subjectivation. The disciplines themselves, the facts and the artifacts 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 don't mind firing off a few shots!), facts and artifacts can be housed in many other conversations, much less bellicose, much more productive and, yes, more friendly.

I have to admit, I am being disingenuous again. In opening the black-box of scientific facts, we knew that 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 middle of 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 objectivation and by the epistemologists trying to fend off all the ills that the unruly mob brings everywhere with it. 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 by myself, are you willing to help me reach it? Can I give you a hand?