

**Unpublished English translation of « Cogitamus six leçons sur les humanités scientifiques »
La Découverte, Paris, 2010 -Letter 1**

Letter 1

Dear Mademoiselle,

Forgive me for having been unable to reply immediately to your questions—I would even say to your confusion. Like you, I'm troubled by all the uproar about the Copenhagen climate change conference. There's the sense that it's very important, that all of life on earth depends on it; but at the same time, there's the obscure feeling that the issues are far too vast, far too remote, far too uncertain, for anyone to be mobilized in a lasting manner. I too am not really sure how to choose between the catastrophist predictions of certain ecologists, who speak of a world foundering before our eyes, and the reassuring words that tell us to calm down, to trust that the developments of science and technology will get us out of the mess. Do we have to choose between the apocalypse and a radiant future? I believe rather that we need to step back a little and inquire where such contradictory feelings may be coming from. That's why I took the liberty of pointing out the existence of my course, which I know you're not enrolled in. If you like, I can summarize the start of it—that way, you won't have any trouble catching up.

You should know that it's based entirely on a careful reading of the times we live in: all I do is give students a few notions drawn from history, philosophy, and sociology, to help them find, within the huge volume of current events, those that interest us. It's rather as if I were simply providing the continuous voiceover for a documentary. Then it's up to the students to work out these notions for themselves and gather together their own documentation, form their own opinions, and write up their own commentary. I grade them not on their knowledge but only on their ability to put to use the few tools I offer them so that they can pursue their own investigation.

I don't know if that way of proceeding will suit you. In any case, if the subject happens to interest you, I advise you to do what the students are doing and begin a journal, which you can fill as you like, as regularly as possible, jotting down the documents, events, and examples you've found, to which you'll later add comments prompted by the course. What I write will just be to help you in keeping that journal. In fact, I'm also keeping my own journal, and it will be easy to compare our information. Would you like us to proceed in that way? As much as possible, I'll try to comment on your finds, respond to your objections, and clarify the notions (somewhat haphazard, I'm warning you) that I introduce in this course. If necessary, we can use a Web site or one of those new digital means of communication, which, we are told, are going to change pedagogy profoundly. We shall see if they can really take the place of private instruction and the direct relationship between a teacher and a student.

Oh, I just realized that I haven't told you yet what the course is actually about. That's because I'm somewhat at a loss to define it succinctly. It would be easier if you were to study economics, ancient Greek, statistics, or agronomy. There would be hundreds, even thousands of people teaching and taking such courses; habits would already be set; you'd have textbooks, exercise books, and bibliographies available to you. Unfortunately, I teach in a field that does not really exist, and I'm just about the only one to define it as I do—well, myself and, let us say, a few dozen colleagues, almost all of whom I have the privilege of knowing!→ [Marginal comment: →This symbol invites readers, if they choose, to refer to “For Further Reading” at the end of this volume.] On one hand, that field is so vast that it touches on existence since the dawn of time; on the other, it is so small that it is based on a scant dozen concepts. That's why students are often lost: they're alarmed by both its enormity and its minuteness. They would really like me to define it a little more precisely.

If I tell you that the course is about “science and technology,” I'm really afraid it will discourage you and that you'll abandon me straightaway. There's nothing more demoralizing to students than to hear that they're going to be studying “science and technology.” You have to realize that they all have very bad memories of what is often a deficient education—at least in France, I don't know how it is where you come from, maybe you've had better luck in Germany? The saddest thing is that many of my students have completed the science requirement. Even when they're “good at math,” as the saying goes, often the only thing on their minds is to get away from the sciences as quickly as possible. As for technology, they find it even more off-putting. “Anything but that,” they say.

But obviously, I don't teach *a* science or *a* technology (I would hardly be qualified to do so, in fact) but rather science and technology *in their relation* to history, culture, literature, economics, politics. As a result, what I call “science and technology” has almost no relationship to what students fear or to what the media present to the public. Or, of course, to what scientists often celebrate in their effort to revive the enthusiasm of ordinary folks for what is sometimes called the “scientific mind” or the “rational view of the world.” That's precisely the problem with my course: you have to anticipate the end of it to grasp what's it's ultimately about! And the risk is that, between the beginning and the end, good intentions will go awry. Are you still with me, or have I lost you already?

Good. If you agree, we could begin with that first difficulty: science and technology are loved or despised because they appear much too *autonomous*. For most people, the reason that it's pointless to take an interest in science and technology is that they are not related to what people call everyday life, culture, values, the humanities, political passions, in short, to everything that really interests them. By virtue of being autonomous, science and technology have become just so many foreign bodies. Someone who is educated in belles lettres, law, or the humanities, or even in the social sciences, need have nothing to do with them—except to admire them, but only from afar. For others, obviously, what gives science and technology all their value is exactly that: “Fortunately,” they say, “the sciences stand completely apart from political concerns, quarrels, ideology, religion. They escape every authority apart from themselves. That is their principal virtue. It is because they are autonomous that they are truthful (in the case of science) or effective (in the case of technology).”

Apparently, then, the matter is settled: science and technology are autonomous. “Unfortunately,” say some; “fortunately,” say others. And so “literary types” will be placed on one side, “math types” on the other. That’s the usual situation. The default position. Well, the goal of my course is to call into question that idea of the autonomy of science and technology. You suspected as much? Yes, especially if, like me, you’ve already started to fill up your journal. (Careful, don’t forget to be vigilant about writing down the source of your documents every time.) At first, don’t worry yourself, just relax and cut out whatever seems to have a relationship to the subject, as I have very vaguely defined it, simply highlighting the passages where you feel someone is drawing some connection between science, technology, and other forms of life. Don’t try to provide brilliant commentary right away. Here, for example, is what I myself have culled in the last few days: just to help you get started. I cut out the articles and underneath them I outlined a few suggestions.

~ I read in *Le Figaro* of July 31, 2009: **“Influenza A (H1N1) is becoming a political issue.”**

Now there’s a question of medicine, of virology, a truly technical question, reported by a journalist who apparently doesn’t know that the sciences are autonomous and must not be politicized. That’s the kind of subject that ought to alert us: the relationship between science and politics is a little more complicated than what the official version says.

~ In *Le Monde* of August 28, 2009, I find an advertisement from the World Wildlife Fund which quotes President Sarkozy saying that France **“supports listing blue fin tuna on the rider to the international convention banning trade in wild species.”**

It seems to me that sushi eaters will have quite a bit to worry about if our “hyperpresident” comes to interfere with the technology for catching their favorite fish. Could fish be swimming in the filthy waters of politics? That’s the sort of document that will interest us a great deal, since it shows that not even “nature” is autonomous and that, there too, things are a little more complicated than we might be led to believe. By the way, don’t hesitate to cut out advertisements, to take photos, to write down conversations. For our purposes, any material is good for the taking.

~ I also cut out an equally interesting article from *Le Monde* of September 2009, with this provocative headline: **“The crisis is calling into question the knowledge and status of economists.”**

In it the reporter accuses the economists not only of failing to predict the financial crisis but of having exacerbated it through their excessive confidence in macroeconomics, “spectacularly useless at best, and positively harmful at worst.” That’s a quotation from Paul Krugman, winner of the Nobel Prize in economics and also a regular columnist for the *New York Times*, which is itself interesting.

I chose that example to encourage you not to limit yourselves to the natural sciences: economics is a social science, but it is all-pervasive and plays a role in every

aspect of our lives, as much as chemistry or medicine. Any controversy about its goals and functions, its reliability and predictive powers, therefore interests us directly.

You see that it's not very difficult to keep a journal, at least at first. Even though, in theory, it seems obvious that one must "begin by carefully separating out" scientific questions from political ones, in practice the question does not seem so clear-cut, at least in the media. I'm sure you'll have no trouble finding many examples of that kind. Where things get complicated is when you try to analyze the connections—apparently quite varied—which our journals will very quickly multiply. That's because we will have to move gradually from simply cutting out documents to a more thorough investigation and then to commentary. How to sort things out between, on one hand, common sense, which tells us—whether to rejoice or to complain about it—that the sciences are foreign bodies and, on the other, that same common sense, which produces multiple examples of their connections?

That is precisely the topic of the first lesson I present to students: *it is not possible to sort things out*; you are necessarily immersed in a contradiction from which you mustn't try to extract yourself too quickly. There is nothing to be done; you must accept *both arguments at once*. Don't immediately exclaim: "These are aberrations. Science must remain apart from all these matters unworthy of it." That's the first notion I would like students to absorb: let us take that contradiction, that double discourse, as our object, making an effort not to rush to take sides right away. Slow down. Take your time.

I think you are advanced enough in your studies to have adopted the habit, in the face of an apparently insurmountable contradiction, of not falling headlong into it but, on the contrary, of taking it for an object. English anthropologists have a principle of method that they sum up in the slogan: "To learn how to transform resources into topics." In other words, learn to transform what usually serves as an explanation into what must rather be explained. I have always found that an excellent principle. It is as if we had behind us a whole set of readymade resources that we use to judge, but often to judge too quickly, too automatically, by conditioned reflex. To begin to think somewhat seriously, we must endeavor to turn around and seize these resources that were previously behind us and place them in front of us, to strip off their husk and see what they consist of. So it is for the autonomy of science. We find that argument indispensable for deciding all sorts of debates, such as those we have just collected in our journals, even though it obviously doesn't do the trick, since we constantly find it contradicted. Well then, let us place it before us; let us make that resource the object of our analysis.

To get this across to students I use Plutarch and his account in *Parallel Lives* of Archimedes' role in the siege of Syracuse. → You'll say it's a little too easy to take such wellknown episodes. But don't forget that, in a class, you really have to dramatize arguments: there's nothing better than a vignette, precisely because it is known. In any case, at one time or another, aren't we always obliged to come back to the Greeks? What interests me in this account is that there is no clearer example that the double language on the autonomy of science and technology was already there, ready to go, eighteen hundred years ago and that it has hardly changed since.

You probably remember that Hiero, the king of Syracuse, exploited the skills of Archimedes, the greatest scientist of the age, to set up the defense of the city against the siege by the Roman general Marcellus (this was in about 212 B.C.E.). But what is sometimes forgotten is that, at the beginning of Plutarch's narrative, it is Archimedes who takes the initiative and gets in touch with the prince. "Archimedes, however, in writing to King Hiero, whose friend and near relation he was, had stated that given the force, any given weight might be moved, and even boasted, we are told, relying on the strength of demonstration, that if there were another earth, by going into it he could remove this" (14.12–13). Hence the famous saying: "Give me a place to stand and I will move the earth." You see that, in this venerable story, Archimedes, full of pride about the discovery of the principle of the lever, is led to boast (there is no other word), in order to *interest* the prince in his work. Hiero, for his part, has not asked for anything. He knows everything about the levers of power, of course, but he has nothing to do with those of physics, statics, real forces. Or at least, if he knows about them by hearsay, he surely doesn't see how to connect the abstruse questions of geometry to the concrete situations of power that confront him every day in his palace. As for the crazy idea of going off to move the earth with a lever of infinite dimensions, that could only look to him like chest-thumping. In fact, like all princes over the course of history faced with scientists' flights of fancy, he really wants to be bowled over by the feats of his near relation and friend, but only on the condition that Archimedes begin by proving what he is saying. It is at this point that the famous episode of the "ship of burden" set in motion by an old man occurs:

Hiero being struck with amazement with this, and entreating him to make good this problem by actual experiment, and show some great weight moved by a small engine, he fixed accordingly upon a ship of burden out of the king's arsenal, which could not be drawn out of the dock without great labour and many men; and, loading her with many passengers and a full freight, sitting himself the while far off, with no great endeavour, but only holding the head of the pulley in his hand and drawing the cords by degrees, he drew the ship in a straight line, as smoothly and evenly as if she had been in the sea. (14.13)

The fact that the experiment is unfeasible, because of friction, does not keep it from being (at least in Plutarch's account) the first *public experiment*, during which a scientist proves a principle of physics before an assembled crowd. What is staged is obviously a technological innovation but also, let us note, a serious *reversal of power relations*: an old man, Archimedes, with the aid of pulleys, becomes *stronger* than a shipful of soldiers and freight.

You will not be surprised when I tell you that, as soon as some mention is made of reversing power relations, every prince pricks up his ears! Even the most abstruse physics becomes truly worthy of interest. By its very principle, the lever had already established solely in the world of geometry and statics—a reversal of power relations, through a calculation of the vectors that make a great length and a light weight on one side *commensurable* with, on the other, a heavy weight and a short length (as we all learned in junior high). Provided, of course, that it has a *base of support*, a *fulcrum*. Now the public experiment translates an expression of geometry into a technical device—the pulley mechanism—whose concrete result (imaginary, of

course) is that a single man can wield power over a large number of soldiers and sailors. Well, well, King Hiero says to himself, Couldn't that Archimedes reverse power relations, no longer between long and short sides, but this time between the Romans and Syracuse? Geometry would surreptitiously give way to geopolitics. Both types of forces—and this is the point of the story—are also rendered *commensurable*.

Plutarch immediately adds: “The king, astonished at this, and convinced of the power of the art [literally, the power of technology], prevailed upon Archimedes to make him engines accommodated to all the purposes, offensive and defensive, of a siege” (14.14).

Archimedes thus finds himself embarked (but we must say that he *was really asking for it*, in all senses of that expression) on a kind of mini-Manhattan Project to reorganize the defense of Syracuse against Marcellus' army. On his own, Archimedes defends Syracuse against all the Romans. The principle of the lever becomes the Syracusans' secret weapon for calculating the change of scale in the engines: the famous “poliorcetics,” or science of defending and attacking strongholds, which has concerned engineers for two thousand years. In a subsequent passage of Plutarch's text, Archimedes himself, because he has managed, precisely, to increase the scale of magnitude of all the war engines, assumes truly gargantuan dimensions:

Marcellus . . . derid[ed] his own artificers and engineers[:] “What,” said he, “must we give up fighting with this geometrical Briareus, who plays pitch-and-toss with our ships, and, with the multitude of darts which he showers at a single moment upon us, really outdoes the hundred-handed giants of mythology?” And doubtless, the rest of the Syracusans were but the body of Archimedes's designs, one soul moving and governing all; for, laying aside all other arms, with this alone they infested the Romans and protected themselves. (17.2–3)

In the final reversal of power relations, it is an old man against the Roman army—and the Romans lose! That's even richer than the magic potion in the Asterix comic book! Obviously, this is a gross exaggeration. It's as if someone said, for example: “Albert Einstein, thanks to his formula $E = mc^2$, made the Empire of Japan bow down to him and won the Pacific War all by himself.” But it is not that exaggeration, which is rather commonplace all in all, that interests me: it is what follows in Plutarch's narrative that is really astounding.

You might have imagined, after such a demonstration of force, some celebration of the power of technology and science, or a grand meditation on the profound harmony between politics (one man rules all the others by reversing power relations through the metaphorical levers of power) and statics, based in reason (any weight, however small it might be taken to be, can lift another, however large you like, by means of a precisely calculated lever). No, not at all. And here is where we'll find, if not the source, then at least the clearest demonstration, of the double language I wanted to show you at work. With a single gesture, Plutarch takes to erasing everything he had earlier said and paints a completely different picture of Archimedes:

Archimedes possessed so high a spirit, so profound a soul, and such treasures of scientific knowledge, that though these inventions had now obtained him a renown of more than human sagacity, he yet would not deign to leave behind him any commentary or writing

on such subjects; but, repudiating as sordid and ignoble the whole trade of engineering, and every sort of art that lends itself to mere use and profit, he placed his whole affection and ambition in those purer speculations where there can be no reference to the vulgar needs of life; studies, the superiority of which to all others is unquestioned, and in which the only doubt can be whether the beauty and grandeur of the subjects examined, [or] the precision and cogency of the methods and means of proof, most deserves our admiration. (17.5–8)

That is what has made any study of the sciences and their history nearly impossible until very recently. Act 1: Archimedes seeks out Hiero to share his craziest ideas. Act 2: Hiero challenges Archimedes to prove the practical utility of his ideas. Act 3: Archimedes succeeds so well that he defends Syracuse on his own against the Romans (Marcellus ultimately wins, but by treachery; Archimedes will finally be murdered, but only after an unfortunate error on the part of one of his overly zealous soldiers). Act 4: Archimedes *has nothing to do* with any practical consideration at all: his only interest is pure science, whose demonstration relies only on itself and which must truly be called “supernatural.” You see the task that awaits us? The scientific humanities, if you want a first definition, consists of learning to consider *the whole play* and not simply one of its acts. At first, Archimedes’ science is completely autonomous (it interests no one but himself and his colleagues, dispersed along the periphery of the Mediterranean); in the middle of the drama, that science is completely continuous with technology and questions of defense; and, at the end, it is again completely autonomous, to the point of relying only on itself (I shall return later to that question of demonstration).

Obviously, this is not a historical description: Plutarch is writing nearly three centuries after the events of Syracuse and, as a good Platonist, he turns Archimedes into a permanent resident in the heaven of Ideas. And yet that mythical account in four episodes had such a lasting influence on Western thought that even today it is apparent everywhere, in barely altered form. Even though this narrative, taken as a whole, ought to prove how difficult a subject the autonomy of science is, how filled with contradictions and mysteries, it is in fact used only to revive once again the absolute—not relative, provisional, or partial—distinction between science and, let us say, the world of politics. To recount the achievements of physics or molecular biology in the present day, writers may use exactly the same tropes as Plutarch did in recounting those of Archimedes. Nothing has changed in the use of that double language. Do you understand now why there would be no point in taking sides for or against scientific autonomy?

In my class, I also take up that narrative, but in its totality, in each of its acts, without trying to reduce it to only one of its phases. If you agree, I will therefore ask you to do as my students do and, from now on, to follow three miracles (presented in the form of questions), *without separating them* from one another:

—how is it that a scientist can interest a prince, even though their realms are so different from each other?

—how is it that these different realms are nevertheless capable of such a perfect continuity that they are made commensurable?

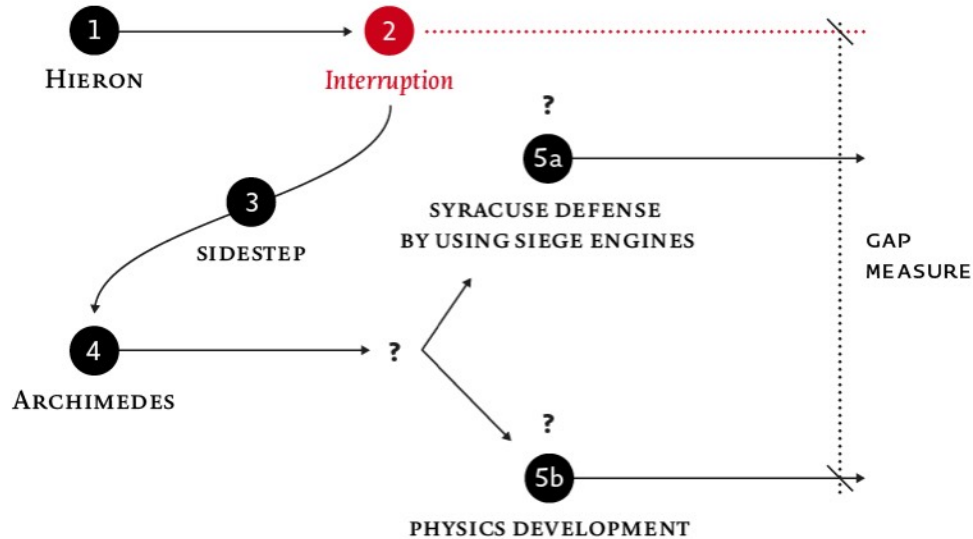
—by what third miracle, even though they are so perfectly joined, do they nevertheless appear so totally incommensurable?

Let me take the opportunity to give you a definition that I have kept from my students, so as not to complicate their lives: I tell them that my course is called scientific humanities, which does not mean very much. In fact, it belongs to a field that I played a role in creating and for which, even in French, the expression “science studies” or “science and technology studies” is used. Sometimes it is called the “sociology of science.”→ You will surely notice that “science studies” also means nothing, except that it is the translation into English of another perfectly ordinary word, taken from the Greek, namely, “epistemology.” Why not say, then, that I am offering a course in epistemology? First, because I would drive students away; but second, because that word has ultimately come to designate, especially in France, an effort to *extirpate* science as much as possible from any connection to the rest. For an epistemologist, or at least for a French epistemologist trained in the school of Gaston Bachelard (1884–1962), a science, in order to become truly scientific, must gradually extract itself from any attachment that would run the risk of invalidating or perverting it.→ That would amount to taking stock only of act 4 of Plutarch’s narrative, forgetting Hiero, Marcellus, the lever, and the reversals of power relations it allows. I could obviously say that I’m offering a course in *political epistemology*. That expression would suit me perfectly, but who would understand me? Therefore, I maintain a certain vagueness, and in the end I’ve grown accustomed to that lovely term “humanities,” which has been used for such a long time to define education and which has the sweet smell of the Renaissance about it. By the way, I’ve recently developed a certain penchant for the sixteenth century. I’ll come back to that.

So there you have the subject of the first class, more or less. I’m still trying to move from a concrete example, in this case Plutarch’s vignette, to a more general concept that should allow students to apply it to what they may find in the news. The first concept I offer them is that of *translation*. It is a term borrowed from the philosopher Michel Serres, who, some thirty years ago, profoundly changed the history of the sciences by linking it, with the help of that notion, to the humanities precisely, that is, to Greek and Latin literature but also to poetry. If that interests you, I’ll provide you with more advanced references.→ But for students, I propose simply that they replace the idea of a break between science and the rest of existence (a break, as we have just seen, that does not even do justice to mythical events) through the notions of *detour* and *composition*. Exaggerating slightly, I claim that we can get through the whole course with only those notions. In other words, I too act like Archimedes: “Give me the concepts of translation and composition and I will move the earth.”

To get my idea across, I use a very elementary diagram (for what it’s worth: you can find others or abandon it altogether). The important thing is to replace the metaphor of a necessary break between science and politics with another metaphor, another *mise-en-scène* if you like, by which one depicts the successive episodes of the connections between Archimedes and Hiero (to continue with that example). As I do for my students, I would like to accustom you to the notion that a given course of action is always *composed* by a series of *detours*, whose interpretation then defines a *lag* that provides the measure of translation. And a translation, of course, is always a

source of ambiguity, that being the advantage of the term. When I say it out of the blue like that, this all seems complicated but, as you'll see, it is in fact very simple (fig. 1.1).



I'll gloss the diagram for you, so that you'll understand how we're going to knit all these translation issues together. Hiero was taking the straight path, that of princes accustomed to the arcana of power, but he did not see how to survive the Roman invader (dotted arrow). That was his major concern. Then Archimedes appeared and proposed to Hiero a new version, a new translation of that anxiety. What does Hiero's problem look like to a physicist? "You will not be able to defend Syracuse—and therefore complete your course of action—unless you agree to take a *sidestep*, in short, a detour, *through* my esoteric research in geometry and statics" (stages 2, 3, and 4). Between Hiero and his goal, Archimedes, shall I say, places a "Do Not Enter" sign and proposes that the prince take a detour through Archimedes' own ideas about the physics of siege engines.

As I have just shown you, there is a promise in that detour but also a risk. The promise is that the prince will really be able to return to the initial goal, but this time equipped with the machines of poliorcetics modified by Archimedes: Syracuse will therefore be defended by the prince's armies in *association* with geometry (stage 5). But there is also a risk: that there will be no return to the initial goal (now *composed* of the *joint* interests of Hiero and Archimedes). When driving, you've surely felt, like everyone else, that slight anxiety when you run into a "Detour" sign. There is always the risk of losing the thread and getting lost. That is what Plutarch's apologue indicates: as a matter of fact, Archimedes was pursuing no goal other than his own, the development of pure research in geometry (stage 5a). Or rather, the action composed by a more or less long detour now provides a large lag between the defense of Syracuse and demonstrations

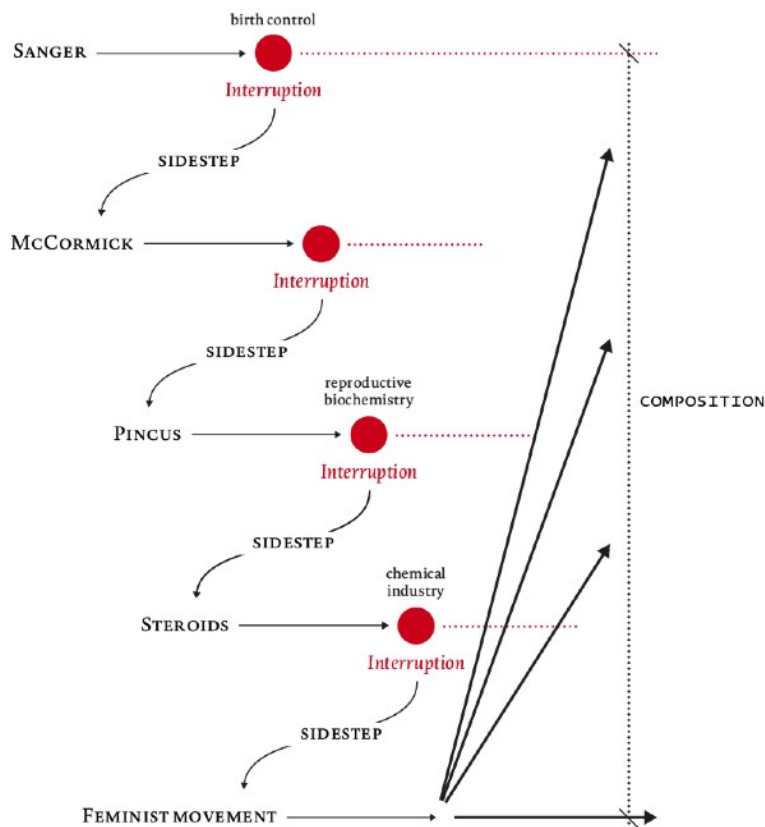
without any practical application (hence the vertical arrow that provides the measure of the ambiguity). And it is truly that lag that must be taken into account: either Hiero exploits Archimedes for *his own* goals, or Archimedes succeeds in diverting the king and his goals in the direction of *his own*. You see why I speak of composition: in the end, the action is woven together by these connections, forming multiple layers of preoccupations, practices, and languages of various kinds—those of war, geometry, philosophy, politics. To translate is to transcribe, transpose, displace, and transfer all at once—and therefore to transport while at the same time transforming.

The advantage of this little diagram is that science and politics no longer need be taken as two disconnected sets placed face to face, whose intersection we would then need to find. They are rather two types of activities moving in roughly the same direction, whose paths will intersect and separate over the course of time. In fact, action is always composed, and the sum of that composition is always ambiguous. That result will be very useful to us later on, when we come to the technology labyrinth (if you agree to follow me that far). It also allows me to give a somewhat more precise meaning to the notion of interest [*intérêt*] or, more exactly, *mutual interest* [*intéressement*, i.e., “profit-sharing”]. I surely don’t need to remind you that, in Latin, interest is what is placed between two things: *inter-esse*. Archimedes *interests* Hiero because he places himself, insinuates himself, between Hiero and his goal: to defend Syracuse. Science will be *interesting* or not depending on its capacity to associate itself to other courses of action, to gain acceptance for the necessary detours, to fulfill its promises, and—an always delicate operation—to then gain recognition as being the principal source of the whole, which is, however, always a composite. Interests are never given from the start; on the contrary, they depend on composition.→

Obviously, my mythological example is now too simplistic, as a result of having been refined. Let us choose another, one that is closer to students: that of the contraceptive pill. Buried under the gesture of taking the pill common to so many young women these days, by a fairly vertiginous series of detours and compositions, are the militant feminist Margaret Sanger (1879–1966); Katharine Dexter McCormick (1875–1967), a widow who inherited the enormous fortune of the tractor manufacturer of the same name; the great chemist Gregory Pincus (1903–1967); as well as the family of what are called the “steroid” molecules. Pincus, along with many others, contributed toward analyzing, synthesizing, and transforming these molecules into a pill whose dosage is becoming more and more carefully calibrated.→ To get across the notion of translation, I’ve made a long story short. Its importance for mores is infinitely greater than Archimedes’ importance for Syracuse, and yet this history is tucked away, folded up—and hence ignored—in the everyday gesture of tens of millions of women.

Sanger sought to help hundreds of women, burdened by unwanted pregnancies, to escape poverty. She was not a chemist, but she knew Pincus by name and was interested at the time in the nascent field of endocrinology. Pincus, for his part, may have been ready to become involved but did not have the material means to do so, and, like many male researchers, he resisted perverting his science with those horrid “secrets of old wives.” As for McCormick, she was neither a chemist nor really a feminist, but she was immensely wealthy. Who acted? Who was responsible? Who invented the pill? The story could obviously be told as the advent of steroids, which would then, as they say, have “impacted” society and mores. But if steroids had interested

(in the sense I have just defined) only chemists, the action would have been only partly composed. In any case, no one would have gone through chemistry to solve the problem of unwanted births. People would have continued to address that problem through morality, religion, and knitting needles—to the great peril of unfortunate working-class women.



What light could my little diagram shed on such a story (too crudely summed up, I concede)? The different layers would multiply, each corresponding to a different course of action, preceded and followed by many detours, each of which would modify the initial goal, would compose a collective action where the state of mores, Sanger’s activism, McCormick’s money, the chemical bonds of steroid atoms, changes in the law, debates for or against the pill in Congress, the capacities of the chemical industry, the reactions of users, the quality of medical care, and so on, would all have to be taken into account (fig. 1.2).

It is clear that, compared to that succession of detours and interconnections, the question of who is ultimately responsible for the overall movement is literally secondary (see the vertical arrow on the right side of the diagram). Why? Well, because it clearly arises after the movements of detour and composition. A historian of science could just as easily say that, without the activists, chemistry would never have become linked to matters of reproduction; or that, without a change in the laws, the innovations of the chemical industry would never have gone beyond the prototype stage. But he could also declare, just as rightly, that “everything resides” in the

discovery of steroids. It is only after the fact that it will be possible to assess the role (which will always remain quite conjectural) of the different actors and to understand their motivations.

You understand why it was unthinkable to begin with an already carved-out field called “the sciences,” then another already carved-out field called “the times,” “the state of society,” “the intellectual milieu,” “the social context,” or the *Zeitgeist* (I apologize, I’m afraid that’s one of the few German words I know), and then wonder whether they may be related or not. The famous autonomy of science, to be defended at all cost or contested as obsolete, is only an arbitrary and belated way of carving things up; it succeeds only in isolating certain elements in these relations of translation and mutual interest, and then it erects them into an incomprehensible face-to-face encounter. Nothing can be accomplished by carving things up in that way, except the asking of questions that are known to be insoluble: “What intersection can exist between steroids and mores?” The response can only be: “None.” In reality, these are not two isolated fields that someone might attempt to juxtapose but rather two branches of the same organism that have developed together. The trajectories of mores and steroids have crossed again and again, to such a point that they have ultimately composed a different way for a portion of the human race to reproduce.

You see that, despite appearances, we have advanced a good distance, since we have replaced an insoluble question with a perfectly empirical program of investigation. Thanks to it, we will be able to follow, as far as we are able, the twists and turns of collective action that, through detours and compositions, will combine elements of very different origins. I was therefore quite right to invite you to transform the notion of the autonomy of the sciences, which you may have previously taken to be an indispensable resource for grasping current events, into an object of study, to be called seriously into question. And I also hope that you understand why I do not tell my students that my course is “about” science and technology. It’s not simply because I would drive them away! It’s because no one has ever been able to carve out, from the pile-up of translations, something that would be “the sciences,” with welldefined edges and a history of their own, and which we could then decide to connect—or not to connect—to other histories (of the world, of mores, of economics, and so on). Hence the ultimately very lovely expression “scientific humanities.” (I do give students a definition of science, but only in the last class!)

With the hope that this first detour will not give you the impression that you’re venturing too far from your initial question, I wish you good reading.

Your professor