

C H A P T E R S I X

A Collective of Humans and Nonhumans

Following Daedalus's Labyrinth

The Greeks used to distinguish the straight path of reason and scientific knowledge, *episteme*, from the clever and crooked path of technical know-how, *metis*. Now that we have seen how indirect, devious, mediated, interconnected, vascularized are the paths taken by scientific facts, we may be able to find a different genealogy for technical artifacts as well. This is all the more necessary because so much of science studies relies on the notion of "construction," borrowed from technical action. As we are going to see, however, the philosophy of technology is no more directly useful for defining human and nonhuman connections than epistemology has been, and for the same reason: in the modernist settlement, theory fails to capture practice, for a reason that will only become clear in Chapter 9. Technical action, thus, presents us with puzzles as bizarre as those involved in the articulation of facts. Having grasped how the classical theory of objectivity fails to do any justice to the practice of science, we are now going to see that the notion of "technical efficiency over matter" in no way accounts for the subtlety of engineers. We may then be able, finally, to understand these nonhumans, which are, I have been claiming since the beginning, full-fledged actors in our collective; we may understand at last why we do not live in a society gazing out at a natural world or in a natural world that includes society as one of its components. Now that nonhumans are no longer confused with objects, it

may be possible to imagine the collective in which humans are entangled with them.

In the myth of Daedalus, all things deviate from the straight line. After Daedalus's escape from the labyrinth, Minos used a subterfuge worthy of Daedalus himself to find the clever craftsman's hiding place and take revenge. Minos, in disguise, heralded far and wide his offer of a reward to anyone who could thread the circumvolved shell of a snail. Daedalus, hidden at the court of King Cocalus and unaware that the offer was a trap, managed the trick by replicating Ariadne's cunning: he attached a thread to an ant and, after allowing it to enter the shell through a hole at its apex, he induced the ant to weave its way through this tiny labyrinth. Triumphant, Daedalus claimed his reward, but King Minos, equally triumphant, asked for Daedalus's extradition to Crete. Cocalus abandoned Daedalus; still, this artful dodger managed, with the help of Cocalus's daughters, to divert the hot water from the plumbing system he had installed in the palace, so that it fell, as if by accident, on Minos in his bath. (The king died, boiled like an egg.) Only for a brief while could Minos outwit his master engineer—Daedalus was always one ruse, one machination ahead of his rivals.

Daedalus embodies the sort of intelligence for which Odysseus (of whom the *Iliad* says that he is *polymetis*, a bag of tricks) is most famed (Détienne and Vernant 1974). Once we enter the realm of engineers and craftsmen, no unmediated action is possible. A *daedalion*, the word in Greek that has been used to describe the labyrinth, is something curved, veering from the straight line, artful but fake, beautiful but contrived (Frontisi-Ducroux 1975). Daedalus is an inventor of contraptions: statues that seem to be alive, military robots that watch over Crete, an ancient version of genetic engineering that enables Poseidon's bull to impregnate Pasiphae to conceive the Minotaur—for which he builds the labyrinth, from which, via another set of machines, he manages to escape, losing his son Icarus on the way. Despised, indispensable, criminal, ever at war with the three kings who draw their power from his machinations, Daedalus is the best eponym for technique—and the concept of *daedalion* is the best tool for penetrating the evolution of what I have called so far the collective*, which in this chapter I want to define more precisely. Our path will lead us not only through philosophy but through what could be called a

*pragmatogony** that is, a wholly mythical “genesis of things,” in the fashion of the cosmogonies of the past.

Folding Humans and Nonhumans into Each Other

To understand techniques—technical means—and their place in the collective, we have to be as devious as the ant to which Daedalus attached his thread (or as the worms bringing the forest to the savanna in Chapter 2). The straight lines of philosophy are of no use when it is the crooked labyrinth of machinery and machinations, of artifacts and *daedalia*, that we have to explore. To cut a hole at the apex of the shell and weave my thread, I need to define, in opposition to Heidegger, what mediation means in the realm of techniques. For Heidegger a technology is never an instrument, a mere tool. Does that mean that technologies mediate action? No, because we have ourselves become instruments for no other end than instrumentality itself (Heidegger 1977). Man—there is no Woman in Heidegger—is possessed by technology, and it is a complete illusion to believe that we can master it. We are, on the contrary, framed by this *Gestell*, which is one way in which Being is unveiled. Is technology inferior to science and pure knowledge? No, because, for Heidegger, far from serving as applied science, technology dominates all, even the purely theoretical sciences. By rationalizing and stockpiling nature, science plays into the hands of technology, whose sole end is to rationalize and stockpile nature without end. Our modern destiny—technology—appears to Heidegger radically different from *poesis*, the kind of “making” that ancient craftsmen knew how to achieve. Technology is unique, insuperable, omnipresent, superior, a monster born in our midst which has already devoured its unwitting midwives. But Heidegger is mistaken. I will try to show why by using a simple, well-known example to demonstrate the impossibility of speaking of any sort of mastery in our relations with nonhumans, *including* their supposed mastery over us.

“Guns kill people” is a slogan of those who try to control the unrestricted sale of guns. To which the National Rifle Association replies with another slogan, “Guns don’t kill people; *people* kill people.” The first slogan is materialist: the gun acts by virtue of *material* components irreducible to the social qualities of the gunman. On account of the gun the law-abiding citizen, a good guy, becomes dangerous. The

NRA, meanwhile, offers (amusingly enough, given its political views) a *sociological* version more often associated with the Left: that the gun does nothing in itself or by virtue of its material components. The gun is a tool, a medium, a neutral carrier of human will. If the gunman is a good guy, the gun will be used wisely and will kill only when appropriate. If the gunman is a crook or a lunatic, then, with *no change in the gun itself*, a killing that would in any case occur will be (simply) carried out more efficiently. What does the gun add to the shooting? In the materialist account, *everything*: an innocent citizen becomes a criminal by virtue of the gun in her hand. The gun enables, of course, but also instructs, directs, even pulls the trigger—and who, with a knife in her hand, has not wanted at some time to stab someone or something? Each artifact has its script, its potential to take hold of passersby and force them to play roles in its story. By contrast, the sociological version of the NRA renders the gun a *neutral* carrier of will that *adds nothing* to the action, playing the role of a passive conductor, through which good and evil are equally able to flow.

I have caricatured the two positions, of course, in an absurdly diametrical opposition. No materialist would really claim that guns kill by themselves. What the materialist claims, more exactly, is that the good citizen is *transformed* by carrying the gun. A good citizen who, without a gun, might simply be angry may become a criminal if he gets his hands on a gun—as if the gun had the power to change Dr. Jekyll into Mr. Hyde. Materialists thus make the intriguing suggestion that our qualities as subjects, our competences, our personalities, depend on what we hold in our hands. Reversing the dogma of moralism, the materialists insist that we are what we have—what we have in our hands, at least.

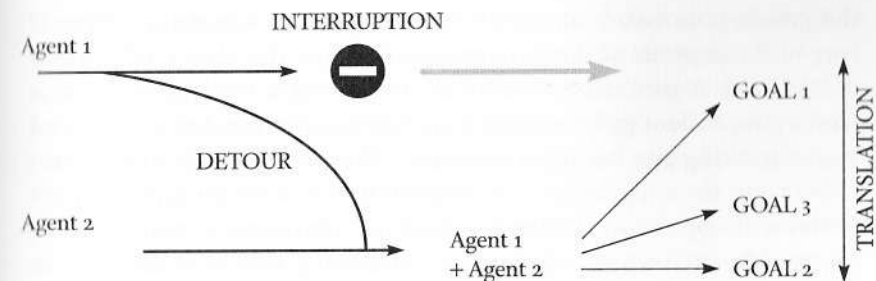
As for the NRA, its members cannot truly maintain that the gun is so neutral an object that it has no part in the act of killing. They have to acknowledge that the gun *adds* something, though not to the moral state of the person holding it. For the NRA, one’s moral state is a Platonic essence: one is born either a good citizen or a criminal. Period. As such, the NRA account is moralist—what matters is what you are, not what you have. The sole contribution of the gun is to speed the act. Killing by fists or knives is simply slower, dirtier, messier. With a gun, one kills better, but at no point does the gun modify one’s goal. Thus NRA sociologists make the troubling suggestion that we can master

techniques, that techniques are nothing more than pliable and diligent slaves. This simple example is enough to show that artifacts are no easier to grasp than facts: it took us two chapters to understand Pasteur's doubled epistemology, and it is going to take us a long time to understand precisely what things make us do.

The First Meaning of Technical Mediation: Interference

Who or what is responsible for the act of killing? Is the gun no more than a piece of mediating technology? The answer to these questions depends on what mediation* means. A first sense of mediation (I will offer four) is what I will call the *program of action**, the series of goals and steps and intentions that an agent can describe in a story like the one about the gun and the gunman (see Figure 6.1). If the agent is human, is angry, wants to take revenge, and if the accomplishment of the agent's goal is interrupted for whatever reason (perhaps the agent is not strong enough), then the agent makes a *detour*, a deviation like the one we saw in Chapter 3 in the operations of conviction between Joliot and Dautry: one cannot speak of techniques any more than of science without speaking of *daedalia*. (Although in English the word "technology" tends to replace the word "technique," I will make use of both terms throughout, reserving the tainted term "technoscience" for a very specific stage in my mythical pragmatogony.) Agent 1 falls back on Agent 2, here a gun. Agent 1 enlists the gun or is enlisted by it—it does not matter which—and a third agent emerges from a fusion of the other two.

The question now becomes which goal the new composite agent will pursue. If it returns, after its detour, to Goal 1, then the NRA story obtains. The gun is then a tool, merely an intermediary. If Agent 3 drifts from Goal 1 to Goal 2, then the materialist story obtains. The gun's intent, the gun's will, the gun's script have superseded those of Agent 1; it is human action that is no more than an intermediary. Note that in the figure it makes no difference if Agent 1 and Agent 2 are reversed. The myth of the Neutral Tool under complete human control and the myth of the Autonomous Destiny that no human can master are symmetrical. But a third possibility is more commonly realized: the creation of a new goal that corresponds to neither agent's program of action. (You only wanted to injure but, with a gun now in your



FIRST MEANING OF MEDIATION : GOAL TRANSLATION

Figure 6.1 As in Figure 3.1, we can portray the relation between two agents as a translation of their goals which results in a composite goal that is different from the two original goals.

hand, you want to kill.) In Chapter 3 I called this uncertainty about goals translation*. As should be clear by now, translation does not mean a shift from one vocabulary to another, from one French word to one English word, for instance, as if the two languages existed independently. I used translation to mean displacement, drift, invention, mediation, the creation of a link that did not exist before and that to some degree modifies the original two.

Which of them, then, the gun or the citizen, is the *actor* in this situation? *Someone else* (a citizen-gun, a gun-citizen). If we try to comprehend techniques while assuming that the psychological capacity of humans is forever fixed, we will not succeed in understanding how techniques are created nor even how they are used. You are a different person with the gun in your hand. As Pasteur showed us in Chapter 4, essence is existence and existence is action. If I define you by what you have (the gun), and by the series of associations that you enter into when you use what you have (when you fire the gun), then you are modified by the gun—more so or less so, depending on the weight of the other associations that you carry.

This translation is wholly symmetrical. You are different with a gun in your hand; the gun is different with you holding it. You are another subject because you hold the gun; the gun is another object because it has entered into a relationship with you. The gun is no longer the gun-in-the-armory or the gun-in-the-drawer or the gun-in-the pocket, but

the gun-in-your-hand, aimed at someone who is screaming. What is true of the subject, of the gunman, is as true of the object, of the gun that is held. A good citizen becomes a criminal, a bad guy becomes a worse guy; a silent gun becomes a fired gun, a new gun becomes a used gun, a sporting gun becomes a weapon. The twin mistake of the materialists and the sociologists is to start with essences, those of subjects or those of objects. As we saw in Chapter 5, that starting point renders impossible our measurement of the mediating role of techniques as well as those of science. If we study the gun and the citizen as propositions, however, we realize that neither subject nor object (nor their goals) is fixed. When the propositions are articulated, they join into a new proposition. They become "someone, something" else.

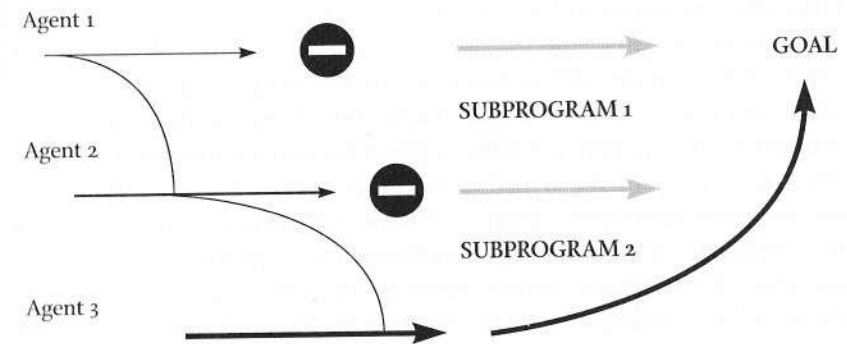
It is now possible to shift our attention to this "someone else," the hybrid actor comprising (for instance) gun and gunman. We must learn to attribute—redistribute—actions to many more agents than are acceptable in either the materialist or the sociological account. Agents can be human or (like the gun) nonhuman, and each can have goals (or functions, as engineers prefer to say). Since the word "agent" in the case of nonhumans is uncommon, a better term, as we have seen, is actant*. Why is this nuance important? Because, for example, in my vignette of the gun and the gunman, I could replace the gunman with "a class of unemployed loiterers," translating the individual agent into a collective; or I could talk of "unconscious motives," translating it into a subindividual agent. I could redescribe the gun as "what the gun lobby puts in the hands of unsuspecting children," translating it from an object into an institution or a commercial network; or I could call it "the action of a trigger on a cartridge through the intermediary of a spring and a firing-pin," translating it into a mechanical series of causes and consequences. These examples of actor-actant symmetry force us to abandon the subject-object dichotomy, a distinction that prevents the understanding of collectives. It is neither people nor guns that kill. Responsibility for action must be shared among the various actants. And this is the first of the four meanings of mediation.

The Second Meaning of Technical Mediation: Composition

One might object that a basic asymmetry lingers—women make computer chips, but no computer has ever made women. Common sense,

however, is not the safest guide here, any more than it is in the sciences. The difficulty we just encountered with the example of the gun remains, and the solution is the same: the prime mover of an action becomes a new, distributed, and nested series of practices whose sum may be possible to add up but only if we respect the mediating role of all the actants mobilized in the series.

To be convincing on this point will require a short inquiry into the way we talk about tools. When someone tells a story about the invention, fabrication, or use of a tool, whether in the animal kingdom or the human, whether in the psychological laboratory or the historical or the prehistoric, the structure is the same (Beck 1980). Some agent has a goal or goals; suddenly the access to the goal is interrupted by that breach in the straight path that distinguishes *metis* from *episteme*. The detour, a *daedalion*, begins (Figure 6.2). The agent, frustrated, turns around in a mad and random search, and then, whether by insight or eureka or by trial and error (there are various psychologies available to account for this moment) the agent seizes upon some other agent—a stick, a partner, an electrical current—and then, so the story goes, returns to the previous task, removes the obstacle, and achieves the goal. Of course, in most tool stories there is not one but two or several *subprograms** nested in one another. A chimpanzee



SECOND MEANING OF MEDIATION : COMPOSITION

Figure 6.2 If the number of subprograms is increased, then the composite goal—here the thick curved line—becomes the common achievement of each of the agents bent by the process of successive translation.

might seize a stick and, finding it too blunt, begin, after another crisis, another subprogram, to sharpen the stick, inventing en route a compound tool. (How far the multiplication of these subprograms can continue raises interesting questions in cognitive psychology and evolutionary theory.) Although one can imagine many other outcomes—for instance, the loss of the original goal in the maze of subprograms—let us suppose that the original task has been resumed.

What interests me here is the *composition* of action marked by the lines that get longer at each step in Figure 6.2. Who performs the action? Agent 1 plus Agent 2 plus Agent 3. Action is a property of associated entities. Agent 1 is allowed, authorized, enabled, afforded by the others. The chimp plus the sharp stick reach (not reaches) the banana. The attribution to one actor of the role of prime mover in no way weakens the necessity of a composition of forces to explain the action. It is by mistake, or unfairness, that our headlines read “Man flies,” “Woman goes into space.” Flying is a property of the whole association of entities that includes airports and planes, launch pads and ticket counters. B-52s do not fly, the U.S. Air Force flies. Action is simply not a property of humans *but of an association of actants*, and this is the second meaning of technical mediation. Provisional “actorial” roles may be attributed to actants only because actants are in the process of exchanging competences, offering one another new possibilities, new goals, new functions. Thus symmetry holds in the case of fabrication as it does in the case of use.

But what does symmetry mean? Symmetry is defined by what is conserved through transformations. In the symmetry between humans and nonhumans, I keep constant the series of competences, of properties, that agents are able to swap by overlapping with one another. I want to situate myself at the stage *before* we can clearly delineate subjects and objects, goals and functions, form and matter, before the swapping of properties and competences is observable and interpretable. Full-fledged human subjects and respectable objects out there in the world cannot be my starting point; they may be my point of arrival. Not only does this correspond to the notion of articulation* I explored in Chapter 5, but it is also consistent with many well-established myths that tell us that we have been made by our tools. The expression *Homo faber* or, better, *Homo faber fabricatus* describes, for Hegel and André Leroi-Gourhan (Leroi-Gourhan 1993) and Marx

and Bergson, a dialectical movement that ends by making us sons and daughters of our own works. As for Heidegger, the relevant myth is that “So long as we represent technology as an instrument, we remain held fast in the will to master it. We press on past the essence of technology” (Heidegger 1977, p. 32). We will see later what can be done with dialectics and the *Gestell*, but if inventing myths is the only way to get on with the job, I shall not hesitate to make up a new one and even to throw in a few more of my diagrams.

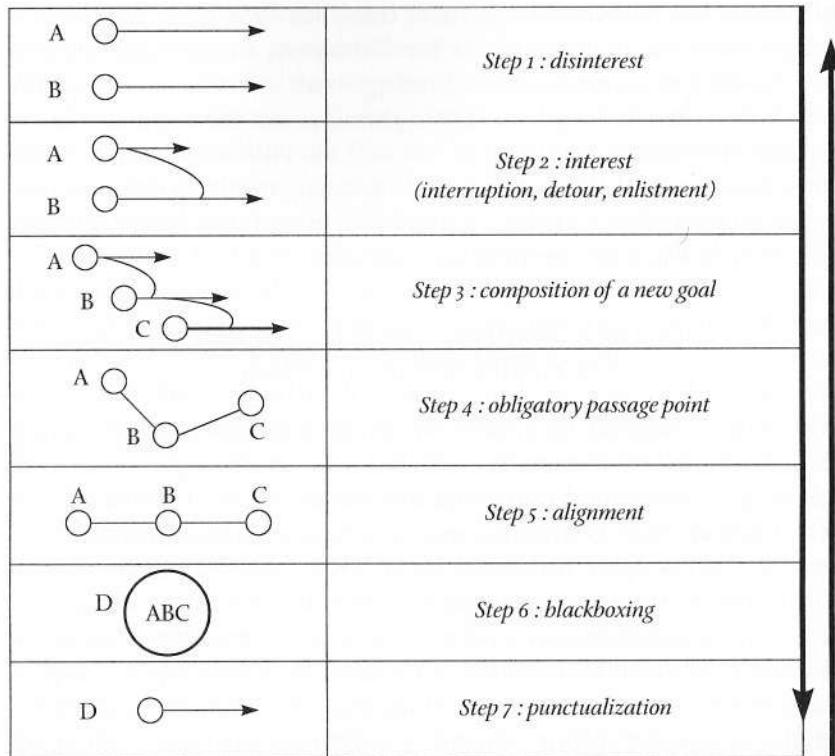
The Third Meaning of Technical Mediation: The Folding of Time and Space

Why is it so difficult to measure, with any precision, the mediating role of techniques? Because the action that we are trying to measure is subject to blackboxing*, a process that makes the joint production of actors and artifacts entirely opaque. Daedalus’s maze shrouds itself in secrecy. Can we open the labyrinth and count what is inside?

Take, for instance, an overhead projector. It is a point in a sequence of action (in a lecture, say), a silent and mute intermediary*, taken for granted, completely determined by its function. Now suppose the projector breaks down. The crisis reminds us of the projector’s existence. As the repairmen swarm around it, adjusting this lens, tightening that bulb, we remember that the projector is made of several parts, each with its role and function and its relatively independent goals. Whereas a moment before the projector scarcely existed, now even its parts have individual existence, each its own “black box.” In an instant our “projector” grew from being composed of zero parts to one to many. How many actants are really there? The philosophy of technology we need has little use for arithmetic.

The crisis continues. The repairmen fall into a routinized sequence of actions, replacing parts. It becomes clear that their actions are composed of steps in a sequence that integrates several human gestures. We no longer focus on an object but see a group of people gathered *around* an object. A shift has occurred between actant and mediator.

Figures 6.1 and 6.2 showed that goals are redefined by associations with nonhuman actants, and that action is a property of the whole association, not only of those actants called human. However, as Figure 6.3 shows, the situation is even more confused, since the *number* of



THIRD MEANING OF MEDIATION:
REVERSIBLE BLACKBOXING

Figure 6.3 Any given assembly of artifacts may be moved up or down this succession of steps depending on the crisis they go through. What we may consider, in routine use, as one agent (step 7) may turn out to be composed of several (step 6) that may not even be aligned (step 4). The history of the earlier translations they had to go through may become visible, until they are freed again from any influence of the others (step 1).

actants varies from step to step. The composition of objects also varies: sometimes objects appear stable, sometimes they appear agitated, like a group of humans around a malfunctioning artifact. Thus the projector may count for one part, for nothing, for one hundred parts, for so many humans, for no humans—and each part itself may count for one, for zero, for many, for an object, for a group. In the seven

steps of Figure 6.3, each action may proceed toward either the dispersion of actants or their integration into a single punctuated whole (a whole that, soon thereafter, will count for nothing). We need to account for all seven steps.

Look around the room in which you are puzzling over Figure 6.3. Consider how many black boxes there are in the room. Open the black boxes; examine the assemblies inside. Each of the parts inside the black box is itself a black box full of parts. If any part were to break, how many humans would immediately materialize around each? How far *back* in time, *away* in space, should we retrace our steps to follow all those silent entities that contribute peacefully to your reading this chapter at your desk? Return each of these entities to step 1; imagine the time when each was disinterested and going its own way, without being bent, enrolled, enlisted, mobilized, folded in any of the others' plots. From which forest should we take our wood? In which quarry should we let the stones quietly rest?

Most of these entities now sit in silence, as if they did not exist, invisible, transparent, mute, bringing to the present scene their force and their action from who knows how many millions of years past. They have a peculiar ontological status, but does this mean that they do not act, that they do not mediate action? Can we say that because we have made all of them—and who is this “we,” by the way? not I, certainly—should they be considered slaves or tools or merely evidence of a *Gestell*? The depth of our ignorance about techniques is unfathomable. We are not even able to count their number, nor can we tell whether they exist as objects or as assemblies or as so many sequences of skilled actions. Yet there remain philosophers who believe there are such things as abject objects . . . If science studies once believed that relying on the construction of artifacts would help account for facts, it is in for a surprise. Nonhumans escape the strictures of objectivity twice; they are neither objects known by a subject nor objects manipulated by a master (nor, of course, are they masters themselves).

The Fourth Meaning of Technical Mediation: Crossing the Boundary between Signs and Things

The reason for such ignorance is made clearer when we consider the fourth and most important meaning of mediation. Up to this point I

have used the terms “story” and “program of action,” “goal” and “function,” “translation” and “interest,” “human” and “nonhuman,” as if techniques were dependable denizens that support the world of discourse. But techniques modify the matter of our expression, not only its form. Techniques have meaning, but they produce meaning via a special type of articulation that, once again, like the circulating reference we met in Chapter 2 and the variable ontology we followed in Chapter 4, crosses the commonsense boundary between signs and things.

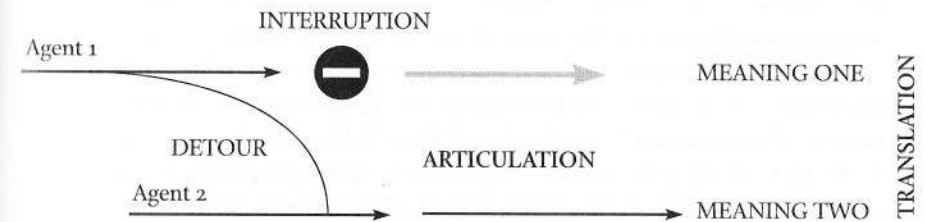
Here is a simple example of what I have in mind: the speed bump that forces drivers to slow down on campus, which in French is called a “sleeping policeman.” The driver’s goal is translated, by means of the speed bump, from “slow down so as not to endanger students” into “slow down and protect your car’s suspension.” The two goals are far apart, and we recognize here the same displacement as in our gun story. The driver’s first version appeals to morality, enlightened disinterest, and reflection, whereas the second appeals to pure selfishness and reflex action. In my experience, there are many more people who would respond to the second than to the first: selfishness is a trait more widely distributed than respect for law and life—at least in France! The driver modifies his behavior through the mediation of the speed bump: he falls back from morality to force. But from an observer’s point of view it does not matter through which channel a given behavior is attained. From her window the chancellor sees that cars are slowing down, respecting her injunction, and for her that is enough.

The transition from reckless to disciplined drivers has been effected through yet another detour. Instead of signs and warnings, the campus engineers have used concrete and pavement. In this context the notion of detour, of translation, should be modified to absorb, not only (as with previous examples) a shift in the definition of goals and functions, but also *a change in the very matter of expression*. The engineers’ program of action, “make drivers slow down on campus,” is now articulated with concrete. What would the right word be to account for this articulation? I could have said “objectified” or “reified” or “realized” or “materialized” or “engraved,” but these words imply an all-powerful human agent imposing his will on shapeless matter, while nonhumans also act, displace goals, and contribute to their definition.

As we see, it is no easier to find the right term for the activity of techniques than for the efficacy of the lactic acid ferments—we will understand in Chapter 9 that this is because they are all factishes*. In the meantime I want to propose yet another term, *delegation* (see Figure 6.4).

Not only has one meaning, in the example of the speed bump, been displaced into another, but an action (the enforcement of the speed law) has been translated into another kind of expression. The engineers’ program is delegated in concrete, and in considering this shift we leave the relative comfort of linguistic metaphors and enter unknown territory. We have not abandoned meaningful human relations and abruptly entered a world of brute material relations—although this might be the impression of drivers, used to dealing with negotiable signs but now confronted by nonnegotiable speed bumps. The shift is not from discourse to matter because, for the engineers, the speed bump is one *meaningful articulation* within a gamut of propositions from which they are no more free to choose than the syntagms* and paradigms* we saw in Chapter 5. What they can do is to explore the associations and the substitutions that trace a unique trajectory through the collective. Thus *we remain in meaning but no longer in discourse*; yet we do not reside among mere objects. Where are we?

Before we can even begin to elaborate a philosophy of techniques we have to understand delegation as yet another type of shifting*, in



FOURTH MEANING OF MEDIATION : DELEGATION

Figure 6.4 As in Figure 6.1, the introduction of a second agent in the path of a first one implies a process of translation; but here the shift in meaning is much greater, since the very nature of the “meaning” has been modified. The matter of the expression has changed along the way.

addition to the one that we used in Chapter 4 to understand Pasteur's laboratory work. If I say to you, for instance, "Let us imagine ourselves in the shoes of the campus engineers when they decided to install the speed bumps," I not only transport you into another space and time but translate you into another actor (Eco 1979). I shift you out of the scene you now occupy. The point of spatial, temporal, and "actorial" shifting, which is basic to all fiction, is to make the reader travel without moving (Greimas and Courtès 1982). You make a detour through the engineers' office, but without leaving your seat. You lend me, for a time, a character who, with the aid of your patience and imagination, travels with me to another place, becomes another actor, then returns to become yourself in your own world again. This mechanism is called identification, by means of which the "enunciator" (I) and the "enunciatee" (you) both invest in the shifting delegates of ourselves within other composite frames of reference.

In the case of the speed bump the shift is "actorial": the "sleeping policeman," as the bump is known, is not a policeman, does not resemble one in the least. The shift is also spatial: on the campus road there now resides a new actant that slows down cars (or damages them). Finally, the shift is temporal: the bump is there night and day. But the enunciator of this technical act has disappeared from the scene—where are the engineers? where is the policeman?—while someone, something, reliably acts as lieu-tenant, holding the enunciator's place. Supposedly the co-presence of enunciators and enunciatees is necessary for an act of fiction to be possible, but what we now have is an absent engineer, a constantly present speed bump, and an enunciatee who has become the user of an artifact.

One may object that this comparison between fictional shifting and the shifts of delegation in technical activity is spurious: to be transported in imagination from France to Brazil is not the same as taking a plane from France to Brazil. True enough, but where does the difference reside? With imaginative transportation, you simultaneously occupy all frames of reference, shifting into and out of all the delegated *personae* that the storyteller offers. Through fiction, *ego, hic, nunc* may be shifted, may become other *personae*, in other places, at other times. But aboard the plane I cannot occupy more than one frame of reference at a time (unless, of course, I sit back and read a novel which takes me, say, to Dublin on a fine June day in 1904). I am seated in an object-institution that connects two airports through an airline. The

act of transportation has been *shifted down**, not out—down to planes, engines, and automatic pilots, object-institutions to which has been delegated the task of moving while the engineers and managers are absent (or limited to monitoring). The co-presence of enunciators and enunciatees has collapsed, along with their many frames of reference, to a single point in time and space. All the frames of reference of the engineers, air-traffic controllers, and ticket agents have been brought together into the single frame of reference of Air France flight 1107 to São Paulo.

An object *stands in* for an actor and creates an asymmetry between absent makers and occasional users. Without this detour, this shifting down, we would not understand how an enunciator could be absent: either it is there, we would say, or it does not exist. But through shifting down another combination of absence and presence becomes possible. In delegation it is not, as in fiction, that I am here and elsewhere, that I am myself and someone else, but that an action, long past, of an actor, long disappeared, is still active here, today, on me. I live in the midst of technical *delegates*; I am folded into nonhumans.

The whole philosophy of techniques has been preoccupied by this detour. Think of technology as *congealed* labor. Consider the very notion of investment: a regular course of action is suspended, a detour is initiated via several types of actants, and the return is a fresh hybrid that carries past acts into the present and permits its many investors to disappear while also remaining present. Such detours subvert the order of time and space—in a minute I may mobilize forces set into motion hundreds or millions of years ago in faraway places. The relative shapes of actants and their ontological status may be completely reshuffled—techniques act as *shape-changers*, making a cop out of a barrel of wet concrete, lending a policeman the permanence and obstinacy of stone. The relative ordering of presence and absence is redistributed—we hourly encounter hundreds, even thousands, of absent makers who are remote in time and space yet simultaneously active and present. And through such detours, finally, the political order is subverted, since I rely on many delegated actions that themselves make me do things on behalf of others who are no longer here, the course of whose existence I cannot even retrace.

A detour of this kind is not easy to understand, and the difficulty is compounded by the accusation of fetishism* made by critics of technology, as we will see in Chapter 9. It is us, the human makers (so they

say), that you see in those machines, those implements, us under another guise, our own hard work. We should restore the human labor (so they command) that stands behind those idols. We heard this story told, to different effect, by the NRA: guns do not act on their own, only humans do so. A fine story, but it comes centuries too late. Humans are no longer *by themselves*. Our delegation of action to other actants that now share our human existence has developed so far that a program of antifetishism could only lead us to a nonhuman world, a lost, phantasmagoric world *before* the mediation of artifacts. The erasure of delegation by the critical antifetishists would render the shifting *down* to technical artifacts as opaque as the shifting *out* to scientific facts (see Figure 6.4).

But we cannot fall back on materialism either. In artifacts and technologies we do not find the efficiency and stubbornness of matter, imprinting chains of cause and effect onto malleable humans. The speed bump is ultimately *not* made of matter; it is full of engineers and chancellors and lawmakers, commingling their wills and their story lines with those of gravel, concrete, paint, and standard calculations. The mediation, the technical translation, that I am trying to understand resides in the blind spot in which society and matter exchange properties. The story I am telling is not a *Homo faber* story, in which the courageous innovator breaks away from the constraints of social order to make contact with hard and inhuman but—at last—objective matter. I am struggling to approach the zone where some, though not all, of the characteristics of pavement become policemen, and some, though not all, of the characteristics of policemen become speed bumps. I have earlier called this zone articulation*, and this is not, as I hope is now clear, a sort of golden mean or dialectic between objectivity and subjectivity. What I want to find is another Ariadne's thread—another Topofil Chaix—to follow how Daedalus folds, weaves, plots, contrives, finds solutions where none are visible, using any expedient at hand, in the cracks and gaps of ordinary routines, swapping properties among inert, animal, symbolic, concrete, and human materials.

Technical Is a Good Adjective, Technique a Lousy Noun

We now understand that techniques do not exist as such, that there is nothing that we can define philosophically or sociologically as an ob-

ject, as an artifact or a piece of technology. There does not exist, any more in technology than in science, anything to play the role of the foil for the human soul in the modernist scenography. The noun "technique"—or its upgraded version, "technology"—does not need to be used to separate humans from the multifarious assemblies with which they combine. But there is an *adjective*, technical, that we can use in many different situations, and rightly so.

"Technical" applies, first of all, to a subprogram, or a series of nested subprograms, like the ones discussed earlier. When we say "this is a technical point," it means that we have to *deviate* for a moment from the main task and that we will eventually *resume* our normal course of action, which is the only focus worth our attention. A black box opens momentarily, and will soon be closed again, becoming completely invisible in the main sequence of action.

Second, "technical" designates the *subordinate* role of people, skills, or objects that occupy this secondary function of being present, indispensable, but invisible. It thus indicates a specialized and highly circumscribed task, clearly subordinate in a hierarchy.

Third, the adjective designates a hitch, a snag, a catch, a hiccup in the smooth functioning of the subprograms, as when we say that "there is a technical problem to solve first." Here the deviation may not lead us back to the main road, as with the first meaning, but may *threaten* the original goal entirely. Technical is no longer a mere detour, but an obstacle, a roadblock, the beginning of a detour, of a long translation, maybe of a whole new labyrinth. What should have been a means may become an end, at least for a while, or maybe a maze, in which we are lost forever.

The fourth meaning carries the same uncertainty about what is an end and what is a means. "Technical skill" and "technical personnel" apply to those with a unique ability, a knack, a gift, and also to the ability to make themselves *indispensable*, to occupy privileged though inferior positions which might be called, borrowing a military term, obligatory passage points. So technical people, objects, or skills are at once inferior (since the main task will eventually be resumed), indispensable (since the goal is unreachable without them), and, in a way, capricious, mysterious, uncertain (since they depend on some highly specialized and sketchily circumscribed knack). Daedalus the perverse and Vulcan the limping god are good illustrations of this meaning of

technical. So the adjective technical has a useful meaning that agrees in common parlance with the first three types of mediation defined above, interference, composition of goals, and blackboxing.

"Technical" also designates a very specific type of *delegation*, of movement, of shifting down, that crosses over with entities that have a different timing, different spaces, different properties, different ontologies, and that are made to share the same destiny, thus creating a new actant. Here the noun form is often used as well as the adjective, as when we say "a technique of communication," "a technique for boiling eggs." In this case the noun does not designate a thing, but a *modus operandi*, a chain of gestures and know-how bringing about some anticipated result.

If one ever comes face to face with a technical object, this is never the beginning but the *end* of a long process of proliferating mediators, a process in which all relevant subprograms, nested one into another, meet in a "simple" task. Instead of the legendary kingdom in which subjects meet objects, one generally finds oneself in the realm of the *personne morale*, of what is called the "body corporate" or the "artificial person." Three extraordinary terms! As if the personality became moral by becoming collective, or collective by becoming artificial, or plural by doubling the Saxon word body with a Latin synonym, *corpus*. A *body corporate* is what we and our artifacts have become. We are an object-institution.

The point sounds trivial if applied asymmetrically. "Of course," one might say, "a piece of technology must be seized and activated by a human subject, a purposeful agent." But the point I am making is symmetrical: what is true of the "object" is still truer of the "subject." There is no sense in which humans may be said to exist as humans without entering into commerce with what authorizes and enables them to exist (that is, to act). A forsaken gun is a mere piece of matter, but what would an abandoned gunner be? A human, yes (a gun is only one artifact among many), but not a soldier—and certainly not one of the NRA's law-abiding Americans. Purposeful action and intentionality may not be properties of objects, but they are not properties of humans either. They are the properties of institutions, of apparatuses, of what Foucault called *dispositifs*. Only corporate bodies are able to absorb the proliferation of mediators, to regulate their expression, to redistribute skills, to force boxes to blacken and close. Ob-

jects that exist simply as objects, detached from a collective life, are unknown, buried in the ground. Technical artifacts are as far from the status of efficiency as scientific facts are from the noble pedestal of objectivity. Real artifacts are always parts of institutions, trembling in their mixed status as mediators, mobilizing faraway lands and people, ready to become people or things, not knowing if they are composed of one or of many, of a black box counting for one or of a labyrinth concealing multitudes (MacKenzie 1990). Boeing 747s do not fly, airlines fly.

Pragmatogony: Is There an Alternative to the Myth of Progress?

In the modernist settlement, objects were housed within nature and subjects within society. We have now replaced objects and subjects with scientific facts and technical artifacts, which have an entirely different destiny and shape. Whereas objects could only face out at the subjects—and vice versa—nonhumans may be folded into humans through the key processes of translation, articulation, delegation, shifting out and down. What name can we give to the house in which they have taken up residence? Not nature*, of course, since its existence is entirely polemical, as we will see in the next chapter. Society* will not do either, since it has been turned, by the social scientists, into a fairy tale of social relations, from which all nonhumans have been carefully enucleated (see Chapter 3). In the newly emerging paradigm, we have substituted the notion of collective*—defined as an exchange of human and nonhuman properties inside a corporate body—for the tainted word "society."

We Live in Collectives, Not in Societies

In abandoning dualism our intent is not to throw everything into the same pot, to efface the distinct features of the various parts within the collective. We want analytical clarity, too, but following different lines than the one drawn for the polemical tug of war between objects and subjects. The name of the game is not to extend subjectivity to things, to treat humans like objects, to take machines for social actors, but to

avoid using the subject-object distinction *at all* in order to talk about the folding of humans and nonhumans. What the new picture seeks to capture are the moves by which any given collective *extends* its social fabric to *other* entities. This is what I have meant, until now, by the provisional expression "Science and technology are what *socialize* nonhumans to bear upon human relations." This is the makeshift expression I had forged as a substitute for the modernist expression: "Science and technology allow minds to break away from society to reach objective nature, and to impose order on efficient matter."

What I'd like is one more diagram, in which we could trace, not how human subjects can break away from the shackles of social life to impose order on nature or to retrieve natural laws to maintain order in society, but how a collective of one given definition can modify its makeup by articulating different associations. In this impossible diagram I would need to follow a series of coherent moves: first, there would be translation*, the means by which we articulate different sorts of matter; next, what I will call, borrowing an image from genetics, crossover, which consists of the exchange of properties among humans and nonhumans; third, a step that can be called enrollment, by which a nonhuman is seduced, manipulated, or induced into the collective; fourth, as we saw in the case of Joliot and his military clients, the mobilization of nonhumans inside the collective, which adds fresh unexpected resources, resulting in strange new hybrids; and, finally, displacement, the direction the collective takes once its shape, extent, and composition have been altered by the enrollment and mobilization of new actants. If we had such a diagram, we would do away with social constructivism for good. Alas, I and my Macintosh have not been able to do better than Figure 6.5.

The only advantage of this figure is to provide a basis for the comparison of collectives, a comparison that is completely independent of demography (of their scale, so to speak). What science studies has done over the past fifteen years is subverted the distinction between ancient techniques (the *poesis* of artisans) and modern (broad-scale, inhuman, domineering) technologies. This distinction was never more than a prejudice. You can modify the size of the half-circle in Figure 6.5, but you do not have to modify its shape. You can modify the angle of the tangents, the extent of the translation, the types of enrollment, the size of the mobilization, the impact of the displacement, but you

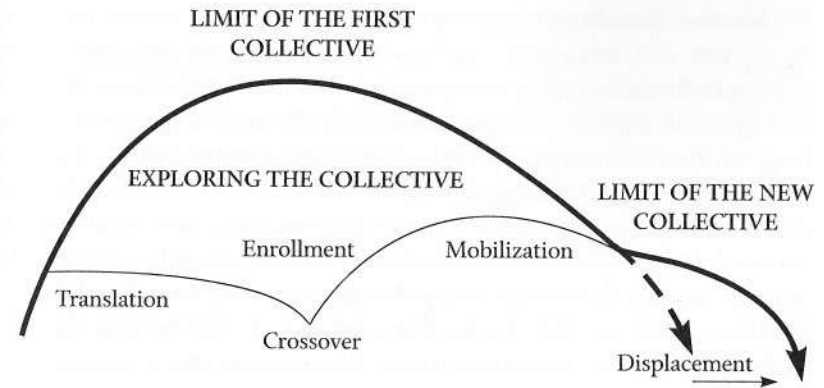


Figure 6.5 Instead of portraying science and technology as breaking away from the strict limits of a society, a collective is conceived as constantly modifying its limit through a process of exploration.

don't have to oppose those collectives that deal only with social relations and those that have been able to break away from them in order to deal with the laws of nature. Contrary to what makes Heideggerians weep, there is an extraordinary *continuity*, which historians and philosophers of technology have increasingly made legible, between nuclear plants, missile-guidance systems, computer-chip design, or subway automation and the ancient mixture of society, symbols, and matter that ethnographers and archaeologists have studied for generations in the cultures of New Guinea, Old England, or sixteenth-century Burgundy (Descola and Palsson 1996). Unlike what is held by the traditional distinction, the difference between an ancient or "primitive" collective and a modern or "advanced" one is *not* that the former manifests a rich mixture of social and technical culture while the latter exhibits a technology devoid of ties with the social order.

The difference, rather, is that the latter translates, crosses over, enrolls, and mobilizes more elements which are more intimately connected, with a more finely woven social fabric, than the former does. The relation between the scale of collectives and the number of nonhumans enlisted in their midst is crucial. One finds, of course, longer chains of action in "modern" collectives, a greater number of

nonhumans (machines, automatons, devices) associated with one another, but one must not overlook the *size* of markets, the *number* of people in their orbits, the *amplitude* of the mobilization: more objects, yes, but many more subjects as well. Those who have tried to distinguish these two sorts of collective by attributing "objectivity" and "efficiency" to modern technology and "humanity" to low-tech *poesis* have been deeply mistaken. Objects and subjects are made simultaneously, and an increased number of subjects is directly related to the number of objects stirred—brewed—into the collective. The adjective modern* does not describe an *increased distance* between society and technology or their alienation, but a deepened *intimacy*, a more intricate mesh, between the two.

Ethnographers describe the complex relations implied by every technical act in traditional cultures, the long and mediated access to matter that these relations suppose, the intricate pattern of myths and rites necessary to produce the simplest adze or the simplest pot, revealing that a variety of social graces and religious mores were necessary for humans to interact with nonhumans (Lemonnier 1993). But do we, even today, have unmediated access to naked matter? Is our interaction with nature short on rites, myths, and protocols (Descola and Palsson 1996)? Has the vascularization of science diminished or increased? Has the maze of Daedalus become straighter or more convoluted?

To believe that we have modernized ourselves would be to ignore most of the cases examined by science and technology studies. How mediated, complicated, cautious, mannered, even baroque is the access to matter of any piece of technology! How many sciences—the functional equivalent of rites—are necessary to prepare artifacts for socialization! How many persons, crafts, and institutions must be in place for the enrollment of even one nonhuman, as we saw with the lactic acid ferment of Chapter 4, or the chain reaction of Chapter 3, or the soil samples of Chapter 2! When ethnographers describe our biotechnology, artificial intelligence, microchips, steelmaking, and so on, the fraternity of ancient and modern collectives is instantly obvious. If anything, what we took as merely symbolic in the old collectives is taken *literally* in the new: in contexts where a few dozen people were once required, thousands are now mobilized; where shortcuts were once possible, much longer chains of action are now necessary. Not

fewer but more, and more intricate, customs and protocols, not fewer mediations but more: many more.

The most important consequence of getting beyond the *Homo faber* myth is that, when we exchange properties with nonhumans through technical delegation, we enter into a complex transaction that pertains to "modern" as well as to traditional collectives. If anything, the modern collective is the one in which the relations of humans and nonhumans are so intimate, the transactions so many, the mediations so convoluted, that there is no plausible sense in which artifact, corporate body, and subject can be distinguished. In order to take account of this symmetry between humans and nonhumans, on the one hand, and this continuity between traditional and modern collectives, on the other, social theory must be somewhat modified.

It is a commonplace in critical theory to say that techniques are social because they have been "socially constructed"—yes, I know, I also used that term once, but that was twenty years ago and I recanted it immediately, since I meant something entirely different from what sociologists and their adversaries mean by social. The notion of a social mediation is vacuous if the meanings of "mediation" and "social" are not made precise. To say that social relations are "reified" in technology, such that when we are confronted with an artifact we are confronted, in effect, with social relations, is to assert a tautology, and a very implausible one at that. If artifacts are nothing but social relations, then why must society work through them to inscribe itself in something else? Why not inscribe itself *directly*, since the artifacts count for nothing? Because, critical theorists continue, through the medium of artifacts, domination and exclusion hide themselves under the guise of natural and objective forces. Critical theory thus deploys a tautology—social relations are nothing but social relations—to which it adds a conspiracy theory: society is hiding behind the fetish of techniques.

But techniques are not fetishes*, they are unpredictable, not means but mediators, means and ends at the same time; and that is why they bear upon the social fabric. Critical theory is unable to explain why artifacts enter the stream of our relations, why we so incessantly recruit and socialize nonhumans. It is not to mirror, congeal, crystallize, or hide social relations, but to remake these very relations through fresh and unexpected sources of action. Society is not stable enough to in-

scribe itself in anything. On the contrary, most of the features of what we mean by social order—scale, asymmetry, durability, power, hierarchy, the distribution of roles—are impossible even to define without recruiting socialized nonhumans. Yes, *society is constructed, but not socially constructed*. Humans, for millions of years, have extended their social relations to other actants with which, with whom, they have swapped many properties, and with which, with whom, they form collectives.

A “Servant” Narrative: The Mythical History of Collectives

A detailed case study of sociotechnical networks ought to follow at this juncture, but many such studies have already been written, and most have failed to make their new social theory felt, as the science wars have made painfully clear to all. Despite the heroic efforts of these studies, many of their authors are all too often misunderstood by readers as cataloguing examples of the “social construction” of technology. Readers account for the evidence mustered in them according to the dualist paradigm that the studies themselves frequently undermine. The obstinate devotion to “social construction” as an explanatory device, whether by careless readers or “critical” authors, seems to derive from the difficulty of disentangling the various meanings of the catchword *sociotechnical*. What I want to do, then, is to peel away, one by one, these layers of meaning and attempt a genealogy of their associations.

Moreover, having disputed the dualist paradigm for years, I have come to realize that no one is prepared to abandon an arbitrary but useful dichotomy, such as that between society and technology, if it is not replaced by categories that have at least a semblance of providing the same discriminating power as the one jettisoned. Of course, I will never be able to do the same political job with the pair human-nonhuman as the subject-object dichotomy has accomplished, since it was in fact to free science from politics that I embarked on this strange undertaking, as I will make clear in the next chapters. In the meantime we can toss around the phrase “sociotechnical assemblages” forever without moving beyond the dualist paradigm that we wish to leave behind. To move forward I must convince the reader that, pending the resolution of the political kidnapping of science, *there is an alternative*

to the myth of progress. At the heart of the science wars lies the powerful accusation that those who undermine the objectivity of science and the efficiency of technology are trying to lead us backward into some primitive, barbaric dark age—that, incredibly, the insights of science studies are somehow “reactionary.”

In spite of its long and complex history, the myth of progress is based on a very rudimentary mechanism (Figure 6.6). What gives the thrust to the arrow of time is that modernity at last breaks out of a confusion, made in the past, between what objects really are in themselves and what the subjectivity of humans believes them to be, projecting onto them passions, biases, and prejudices. What could be called a front of modernization—like the Western Frontier—thus clearly distinguishes the confused past from the future, which will be more and more radiant, no doubt about that, because it will distinguish even more clearly the efficiency and objectivity of the laws of nature from the values, rights, ethical requirements, subjectivity, and politics of the human realm. With this map in their hands, science warriors have no difficulty situating science studies: “Since they are always insisting that objectivity and subjectivity [the science warriors’ terms for nonhumans and humans] are mixed up, science students are leading us in only one possible direction, into the obscure past out of which we must extract ourselves by a movement of radical conversion,

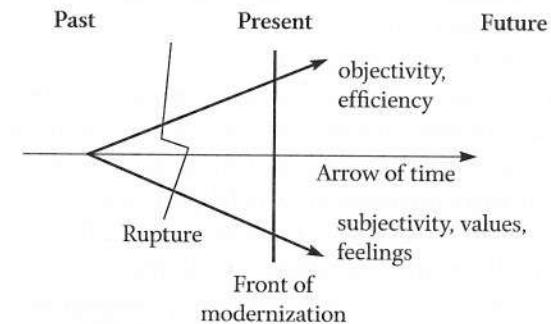


Figure 6.6 What makes the arrow of time thrust forward in the modernist narrative of progress is the certainty that the past will differ from the future because what was confused will become distinct: objectivity and subjectivity will no longer be mixed up. The result of this certainty is a front of modernization that allows one to distinguish slips backward from steps forward.

the conversion through which a barbarian premodernity becomes a civilised modernity.”

In an interesting case of cartographic incommensurability, however, science studies uses an entirely different map (Figure 6.7). The arrow of time is *still there*, it still has a powerful and maybe irresistible thrust, but an entirely different mechanism makes it tick. Instead of clarifying even further the relations between objectivity and subjectivity, time enmeshes, at an ever greater level of intimacy and on an ever greater scale, humans and nonhumans with each other. The feeling of time, the definition of where it leads, of what we should do, of what war we should wage, is entirely different in the two maps, since in the one I use, Figure 6.7, the confusion of humans and nonhumans is not only our past *but our future as well*. If there is one thing of which we may be as certain as we are of death and taxation, it is that we will live tomorrow in imbroglios of science, techniques, and society *even more tightly linked* than those of yesterday—as the mad cow affair has demonstrated so clearly to European beefeaters. The difference between the two maps is total, because what the modernist science warriors see as a horror to be avoided at all costs—the mixing up of objectivity and subjectivity—is for us, on the contrary, the hallmark of a civilized life, except that what time mixes up in the future even more than in the past *are not objects and subjects at all, but humans and nonhumans*, and that makes a world of difference. Of this difference the science warriors remain blissfully ignorant, convinced that we want to confuse objectivity and subjectivity.

I am now in the usual quandary of this book. I have to offer an alternative picture of the world that can rely on none of the resources of common sense although, in the end, I aim at nothing but common sense. The myth of progress has centuries of institutionalization behind it, and my little pragmatogony is helped by nothing but my miserable diagrams. And yet I have to go on, since the myth of progress is so powerful that it puts any discussion to an end.

Yes, I want to tell another tale. For my present pragmatogony*, I have isolated eleven distinct layers. Of course I do not claim for these definitions, or for their sequence, any plausibility. I simply want to show that the tyranny of the dichotomy between objects and subjects is not inevitable, since it is possible to envision another myth in which it plays no role. If I succeed in opening some space for the imagination,

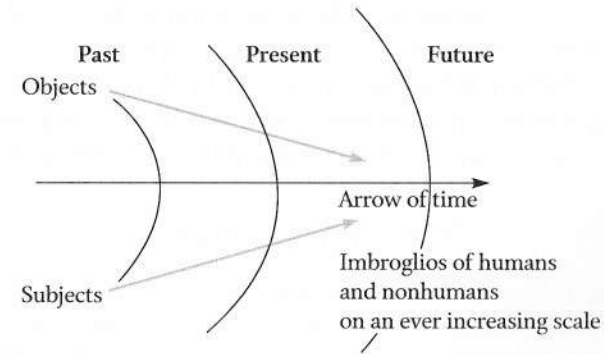


Figure 6.7 In the alternative “servant” narrative there is still an arrow of time, but it is registered very differently from Figure 6.6: the two lines of objects and subjects become more confused in the future than they were in the past, hence the feeling of instability. What is growing instead is the ever expanding scale at which humans and nonhumans are connected together.

then we are not forever stuck with the implausible myth of progress. If I could even begin to recite this pragmatogony—I use this word to insist on its fanciful character—I would have found an alternative to the myth of progress, that most powerful of all the modernist myths, the one that held my friend under its sway when he asked me, in Chapter 1, “Do we know more than we used to?” No, we don’t know more, if by this expression we mean that every day we extract ourselves further from a confusion between facts, on the one hand, and society, on the other. But yes, we do know a good deal more, if by this we mean that our collectives are tying themselves ever more deeply, more intimately, into imbroglios of humans and nonhumans. Until we have an alternative to the notion of progress, provisional as it may be, science warriors will always be able to attach to science studies the infamous stigma of being “reactionary.”

I will build this alternative with the strangest of means. I want to highlight the successive crossovers through which humans and nonhumans have exchanged their properties. Each of those crossovers results in a dramatic change in the scale of the collective, in its composition, and in the degree to which humans and nonhumans are enmeshed. To tell my tale I will open Pandora’s box backward; that is, starting with the most recent types of folding, I will try to map the laby-

rinth until we find the earliest (mythical) folding. As we will see, contrary to the science warriors' fear, no dangerous regression is involved here, since all of the earlier steps are still with us today. Far from being a horrifying miscegenation between objects and subjects, they are simply the very hybridizations that make us humans and nonhumans.

Level 11: Political Ecology

Talk of a crossover between techniques and politics does not, in my pragmatology, indicate belief in the distinction between a material realm and a social one. I am simply unpacking the eleventh layer of what is packed in the definitions of society and technique. The eleventh interpretation of the crossover—the swapping of properties—between humans and nonhumans is the simplest to define because it is the most *literal*. Lawyers, activists, ecologists, businessmen, political philosophers, are now seriously talking, in the context of our ecological crisis, of granting to nonhumans some sort of rights and even legal standing. Not so many years ago, contemplating the sky meant thinking of matter, or of nature. These days we look up at a sociopolitical imbroglio, since the depletion of the ozone layer brings together a scientific controversy, a political dispute between North and South, and immense strategic changes in industry. Political representation of nonhumans seems not only plausible now but necessary, when the notion would have seemed ludicrous or indecent not long ago. We used to deride primitive peoples who imagined that a disorder in society, a pollution, could threaten the natural order. We no longer laugh so heartily, as we abstain from using aerosols for fear the sky may fall on our heads. Like the “primitives,” we fear the pollution caused by our negligence—which means of course that neither “they” nor “we” have ever been primitive.

As with all crossovers, all exchanges, this one mixes elements from both sides, the political with the scientific and technical, and this mixture is not a haphazard rearrangement. Technologies have taught us how to manage vast assemblies of nonhumans; our newest socio-technical hybrid brings what we have learned to bear on the political system. The new hybrid remains a nonhuman, but not only has it lost its material and objective character, it has acquired properties of citizenship. It has, for instance, the right not to be enslaved. This first

layer of meaning—the last in chronological sequence to arrive—is that of political ecology or, to use Michel Serres's term, “the natural contract” (Serres 1995). *Literally*, not symbolically as before, we have to manage the planet we inhabit, and must now define what I will call in the next chapter a politics of things.

Level 10: Technoscience

If I descend to the tenth layer, I see that our current definition of technology is itself due to the crossover between a previous definition of society and a particular version of what a nonhuman can be. To illustrate: some time ago, at the Institut Pasteur, a scientist introduced himself, “Hi, I am the coordinator of yeast chromosome 11.” The hybrid whose hand I shook was, all at once, a person (he called himself “I”), a corporate body (“the coordinator”), and a natural phenomenon (the genome, the DNA sequence, of yeast). The dualist paradigm will not allow us to understand this hybrid. Place its social aspect on one side and yeast DNA on the other, and you will bungle not only the speaker's words but also the opportunity to grasp how a genome becomes known to an organization and how an organization is naturalized in a DNA sequence on a hard disk.

We again encounter a crossover here, but it is of a different sort and goes in a different direction, although it could also be called sociotechnical. For the scientist I interviewed there is no question of granting any sort of rights, of citizenship, to yeast. For him yeast is a strictly material entity. Still, the industrial laboratory where he works is a place in which new modes of organization of labor elicit completely new features in nonhumans. Yeast has been put to work for millennia, of course, for instance in the old brewing industry, but now it works for a network of thirty European laboratories where its genome is mapped, humanized, and socialized, as a code, a book, a program of action, compatible with our ways of coding, counting, and reading, retaining none of its material quality, the quality of an outsider. It is absorbed into the collective. Through technoscience—defined, for my purposes here, as a fusion of science, organization, and industry—the forms of coordination learned through “networks of power” (see Level 9) are extended to inarticulate entities. Nonhumans are endowed with speech, however primitive, with intelligence, fore-

sight, self-control, and discipline, in a fashion both large-scale and intimate. Socialness is shared with nonhumans in an almost promiscuous way. While in this model, the tenth meaning of sociotechnical (see Figure 6.8), automata have no rights, they are much more than material entities; they are complex organizations.

Level 9: Networks of Power

Technoscientific organizations, however, are not purely social, because they themselves recapitulate, in my story, nine prior crossovers of humans and nonhumans. Alfred Chandler and Thomas Hughes have each traced the interpenetration of technical and social factors in what Chandler terms the “global corporation” (Chandler 1977) and Hughes terms “networks of power” (Hughes 1983). Here again the phrase “sociotechnical imbroglio” would be apt, and one could replace the dualist paradigm with the “seamless web” of technical and social factors so beautifully traced by Hughes. But the point of my little genealogy is also to identify, inside the seamless web, properties borrowed from the social world in order to socialize nonhumans and properties borrowed from nonhumans in order to naturalize and expand the social realm. For each layer of meaning, whatever happens happens as if we are learning, in our contacts with one side, ontological properties that are then reimported to the other side, generating new, completely unexpected effects.

The extension of networks of power in the electrical industry, in telecommunications, in transportation, is impossible to imagine without a massive mobilization of material entities. Hughes’s book is exemplary for students of technology because it shows how a technical invention (electric lighting) led to the establishment (by Edison) of a corporation of unprecedented scale, its scope directly related to the physical properties of electrical networks. Not that Hughes in any way talks of the infrastructure triggering changes in the superstructure; on the contrary, his networks of power are complete hybrids, though hybrids of a peculiar sort—they lend their nonhuman qualities to what were until then weak, local, and scattered corporate bodies. The management of large masses of electrons, clients, power stations, subsidiaries, meters, and dispatching rooms acquires the formal and universal character of scientific laws.

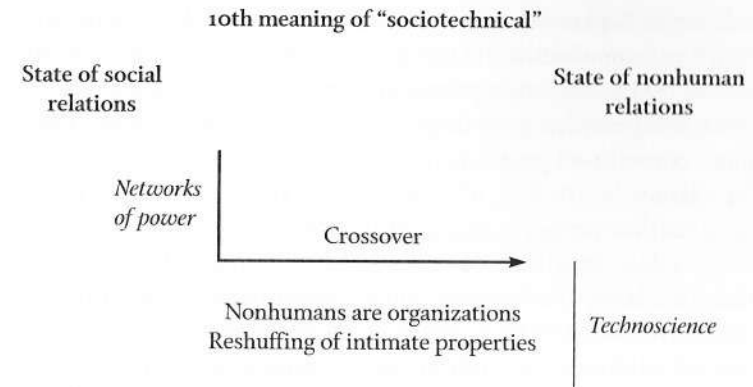


Figure 6.8 Each step in the mythical pragmatogony may be sketched as a crossover through which skills and properties learned in social relations are made relevant for establishing relations within nonhumans. By convention, the next step will be understood as going in the opposite direction.

This ninth layer of meaning resembles the eleventh, since in both cases the crossover goes roughly from nonhumans to corporate bodies. (What can be done with electrons can be done with electors.) But the intimacy of human and nonhuman is less apparent in networks of power than in political ecology. Edison, Bell, and Ford mobilized entities that looked like matter, that seemed nonsocial, whereas political ecology involves the fate of nonhumans already socialized, so closely related to us that they have to be protected by delineation of their legal rights.

Level 8: Industry

Philosophers and sociologists of techniques tend to imagine that there is no difficulty in defining material entities because they are objective, unproblematically composed of forces, elements, atoms. Only the social, the human realm, is difficult to interpret, we often think, because it is complexly historical and, as they say, “symbolic.” But whenever we talk of matter we are really considering, as I am trying to show here, a *package* of former crossovers between social and natural elements, so that what we take to be primitive and pure terms are belated and mixed ones. Already we have seen that matter varies greatly

from layer to layer—matter in the layer I have called “political ecology” differs from that in the layers called “technology” and “networks of power.” Far from being primitive, immutable, and ahistorical, matter too has a complex genealogy and is handed down to us through a long and convoluted pragmatogony.

The extraordinary feat of what I will call *industry* is to extend to matter a further property that we think of as exclusively social, the capacity to relate to others of one's kind, to conspecifics, so to speak. Nonhumans have this capacity when they are made part of the assembly of actants that we call a machine: an automaton endowed with autonomy of some sort and submitted to regular laws that can be measured with instruments and accounting procedures. From tools held in the hands of human workers, the shift historically was to assemblies of machines, where tools relate to one another, creating a massive array of labor and material relations in factories that Marx described as so many circles of hell. The paradox of this stage of relations between humans and nonhumans is that it has been termed “alienation,” dehumanization, as if this were the first time that poor and exploited human weakness was confronted by an all-powerful objective force. However, to relate nonhumans together in an assembly of machines, ruled by laws and accounted for by instruments, is to grant them a sort of social life.

Indeed, the modernist project consists in creating this peculiar hybrid: a fabricated nonhuman that has nothing of the character of society and politics yet builds the body politic all the more effectively because it seems completely estranged from humanity. This famous shapeless matter, celebrated so fervently throughout the eighteenth and nineteenth centuries, which is there for Man's—but rarely Woman's—ingenuity to mold and fashion, is only one of many ways to socialize nonhumans. They have been socialized to such an extent that they now have the capacity to create an assembly of their own, an automaton, checking and surveying, pushing and triggering other automata, as if with full autonomy. In effect, however, the properties of the “megamachine” (see Level 7) have been extended to nonhumans.

It is only because we have not undertaken an anthropology of our modern world that we can overlook the strange and hybrid quality of matter as it is seized and implemented by industry. We take matter as mechanistic, forgetting that mechanism is one half of the modern

definition of society*. A society of machines? Yes, the eighth meaning of the word sociotechnical, though it seems to designate an unproblematic industry, dominating matter through machinery, is the strangest sociotechnical imbroglio yet. Matter is not a given but a recent historical creation.

Level 7: The Megamachine

But where does industry come from? It is neither a given nor the sudden discovery by capitalism of the objective laws of matter. We have to imagine its genealogy through earlier and more primitive meanings of the term sociotechnical. Lewis Mumford has made the intriguing suggestion that the megamachine—the organization of large numbers of humans via chains of command, deliberate planning, and accounting procedures—represents a change of scale that had to be made before wheels and gears could be developed (Mumford 1966). At some point in history human interactions come to be mediated through a large, stratified, externalized body politic that keeps track, through a range of “intellectual techniques” (writing and counting, basically), of the many nested subprograms for action. When some, though not all, of these subprograms are replaced by nonhumans, machinery and factories are born. The nonhumans, in this view, enter an organization that is already in place and take on a role rehearsed for centuries by obedient human servants enrolled in the imperial megamachine.

In this seventh level, the mass of nonhumans assembled in cities by an internalized ecology (I will define this expression shortly) has been brought to bear on empire building. Mumford's hypothesis is debatable, to say the least, when our context of discussion is the history of technology; but the hypothesis makes excellent sense in the context of my pragmatogony. Before it is possible to delegate action to nonhumans, and possible to relate nonhumans to one another in an automaton, it must first be possible to nest a range of subprograms for action into one another without losing track of them. Management, Mumford would say, precedes the expansion of material techniques. More in keeping with the logic of my story, one might say that *whenever we learn something about the management of humans, we shift that knowledge to nonhumans and endow them with more and more organizational properties*. The even-numbered episodes I have recounted so far

follow this pattern: industry shifts to nonhumans the management of people learned in the imperial machine, much as technoscience shifts to nonhumans the large-scale management learned through networks of power. In the odd-numbered levels, the opposite process is at work: *what has been learned from nonhumans is reimported so as to reconfigure people.*

Level 6: Internalized Ecology

In the context of layer seven, the megamachine seems a pure and even final form, composed entirely of social relations; but, as we reach layer six and examine what underlies the megamachine, we find the most extraordinary extension of social relations to nonhumans: agriculture and the domestication of animals. The intense socialization, reeducation, and reconfiguration of plants and animals—so intense that they change shape, function, and often genetic makeup—is what I mean by the term “internalized ecology.” As with our other even-numbered levels, domestication cannot be described as a sudden access to an objective material realm that exists *beyond* the narrow limits of the social. In order to enroll animals, plants, proteins in the emerging collective, one must first endow them with the social characteristics necessary for their integration. This shift of characteristics results in a manmade landscape for society (villages and cities) that completely alters what was until then meant by social and material life. In describing the sixth level we may speak of urban life, empires, and organizations, but not of society and techniques—or of symbolic representation and infrastructure. So profound are the changes entailed at this level that we pass beyond the gates of history and enter more profoundly those of prehistory, of mythology.

Level 5: Society

What is a society, the starting point of all social explanations, the *a priori* of all social science? If my pragmatogony is even vaguely suggestive, society cannot be part of our final vocabulary, since the term had itself to be made—“socially constructed” as the misleading expression goes. But according to the Durkheimian interpretation, a society is primitive indeed: it precedes individual action, lasts very much longer

than any interaction does, dominates our lives; it is that in which we are born, live, and die. It is externalized, reified, more real than ourselves, and hence the origin of all religion and sacred ritual, which for Durkheim are nothing but the return, through figuration and myth, of the transcendent to individual interactions.

And yet society itself is constructed only through such quotidian interactions. However advanced, differentiated, and disciplined society becomes, we still repair the social fabric out of our own, immanent knowledge and methods. Durkheim may be right, but so is Harold Garfinkel. Perhaps the solution, in keeping with the generative principle of my genealogy, is to look for nonhumans. (This explicit principle is: look for nonhumans when the emergence of a social feature is inexplicable; look to the state of social relations when a new and inexplicable type of object enters the collective.) What Durkheim mistook for the effect of a *sui generis* social order is simply the effect of having brought so many techniques to bear on our social relations. It was from techniques, that is, the ability to nest several subprograms, that we learned what it means to subsist and expand, to accept a role and discharge a function. By reimporting this competence into the definition of society, we taught ourselves to reify it, to make society stand independent of fast-moving interactions. We even learned how to delegate to society the task of relegating us to roles and functions. Society exists, in other words, *but is not socially constructed*. Nonhumans proliferate below the bottom line of social theory.

Level 4: Techniques

By this stage in our speculative genealogy we can no longer speak of humans, of anatomically modern humans, but only of social prehumans. At last we are in a position to define technique, in the sense of a *modus operandi*, with some precision. Techniques, we learn from archaeologists, are articulated subprograms for actions that subsist (in time) and extend (in space). Techniques imply not society (that late-developing hybrid) but a semisocial organization that brings together nonhumans from very different seasons, places, and materials. A bow and arrow, a javelin, a hammer, a net, an article of clothing are composed of parts and pieces that require recombination in sequences of time and space that bear no relation to their original settings. Tech-

niques are what happen to tools and nonhuman actants when they are processed through an organization that extracts, recombines, and socializes them. Even the simplest techniques are sociotechnical; even at this primitive level of meaning, forms of organization are inseparable from technical gestures.

Level 3: Social Complication

But what form of organization can explain these recombinations? Recall that at this stage there is no society, no overarching framework, no dispatcher of roles and functions; there are merely interactions among prehumans. Shirley Strum and I call this third layer of meaning *social complication* (Strum and Latour 1987). Here complex interactions are marked and followed by nonhumans enrolled for a specific purpose. What purpose? Nonhumans stabilize social negotiations. Nonhumans are at once pliable and durable; they can be shaped very quickly but, once shaped, last far longer than the interactions that fabricated them. Social interactions are extremely labile and transitory. More precisely, either they are negotiable but transient or, if they are encoded (for instance) in the genetic makeup, they are extremely durable but difficult to renegotiate. The involvement of nonhumans resolves the contradiction between durability and negotiability. It becomes possible to follow (or "blackbox") interactions, to recombine highly complicated tasks, to nest subprograms into one another. What was impossible for complex* social animals to accomplish becomes possible for prehumans—who use tools not to acquire food but to fix, underline, materialize, and keep track of the social realm. Though composed only of interactions, the social realm becomes visible and attains through the enlistment of nonhumans—tools—some measure of durability.

Level 2: The Basic Tool Kit

The tools themselves, wherever they came from, offer the only testimony on behalf of hundreds of thousands of years. Many archaeologists proceed on the assumption that the basic tool kit (as I call it) and techniques are directly related by an evolution of tools into composite tools. But there is no *direct* route from flints to nuclear power plants. Further, there is no direct route, as many social theorists presume

there to be, from social complication to society, megamachines, networks. Finally, there is not a set of parallel histories, the history of infrastructure and the history of superstructure, but only one sociotechnical history (Latour and Lemonnier 1994).

What, then, is a tool? The extension of social skills to nonhumans. Machiavellian monkeys and apes possess little in the way of techniques, but can devise social tools (as Hans Kummer has called them; Kummer 1993) through complex strategies of manipulating and modifying one another. If you grant the prehumans of my own mythology the same kind of social complexity, you grant as well that they may generate tools by *shifting* that competence to nonhumans, by treating a stone, say, as a social partner, modifying it, then using it to act on a second stone. Prehuman tools, in contrast to the ad hoc implements of other primates, also represent the extension of a skill rehearsed in the realm of social interactions.

Level 1: Social Complexity

We have finally reached the level of the Machiavellian primates, the last circumvolution in Daedalus's maze. Here they engage in social interactions to repair a constantly decaying social order. They manipulate one another to survive in groups, with each group of conspecifics in a state of constant mutual interference (Strum 1987). We call this state, this level, social complexity. I will leave it to the ample literature of primatology to show that this stage is no more free of contact with tools and techniques than any of the later stages (McGrew 1992).

An Impossible but Necessary Recapitulation

I know I should not do it. I more than anyone ought to see that it is madness, not only to peel away the different meanings of sociotechnical, but also to recapitulate all of them in a single diagram, as if we could read off the history of the world at a glance. And yet it is always surprising to see how few alternatives we have to the grandiose scenography of progress. We may tell a lugubrious countertale of decay and decadence as if, at each step in the extension of science and technology, we were stepping down, away from our humanity. This is what Heidegger did, and his account has the somber and powerful ap-

peal of all tales of decadence. We may also abstain from telling any master narrative, under the pretext that things are always local, historical, contingent, complex, multiperspectival, and that it is a crime to hold them all in one pathetically poor scheme. But this ban on master narratives is never very effective, because, in the back of our minds, no matter how firmly we are convinced of the radical multiplicity of existence, something surreptitiously gathers everything into one little bundle which may be even cruder than my diagrams—including the postmodern scenography of multiplicity and perspective. This is why, against the ban on master narratives, I cling to the right to tell a “servant” narrative. My aim is not to be reasonable, respectable, or sensible. It is to fight modernism by finding the hideout in which science has been held since being kidnapped for political purposes I do not share.

If we gather in one table the different layers I have briefly outlined—one of my other excuses is how brief the survey, covering so many millions of years, has been!—we may give some sense to a story in which the further we go the more articulated are the collectives we live in (see Figure 6.9). To be sure, we are not ascending toward a future made of more subjectivity and more objectivity. But neither are we descending, chased ever further from the Eden of humanity and *poesis*.

Even if the speculative theory I have outlined is entirely false, it shows, at the very least, the possibility of imagining a genealogical alternative to the dualist paradigm. We are not forever trapped in a boring alternation between objects or matter and subjects or symbols. We are not limited to “not only . . . but also” explanations. My little origin myth makes apparent the impossibility of having an artifact that does not incorporate social relations, as well as the impossibility of defining social structures without accounting for the large role played in them by nonhumans.

Second, and more important, the genealogy demonstrates that it is false to claim, as so many do, that once we abandon the dichotomy between society and techniques we are faced with a seamless web of factors in which all is included in all. The properties of humans and nonhumans cannot be swapped haphazardly. Not only is there an order in the exchange of properties, but in each of the eleven layers the meaning of the word “sociotechnical” is clarified if we consider the exchange: that which has been learned from nonhumans and reimported

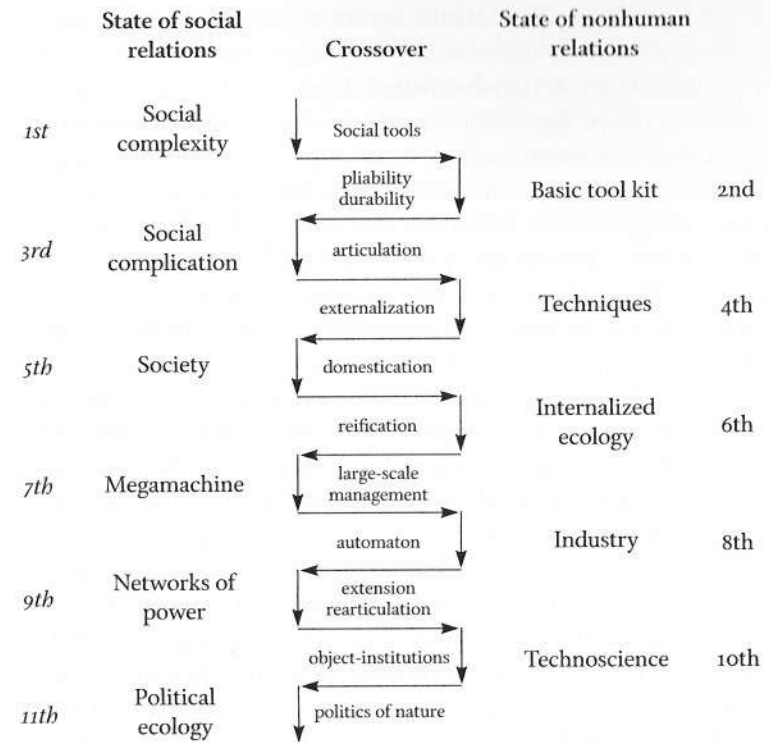


Figure 6.9 If the successive crossovers are summed up, a pattern emerges: relations among humans are made out of a previous set of relations that related nonhumans to one another; these new skills and properties are then reused to pattern new types of relations among nonhumans, and so on; at each (mythical) stage the scale and the entanglement increase. The key feature of this myth, is that, at the final stage, the definitions we can make of humans and nonhumans should recapitulate all the earlier layers of history. The further we go, the less pure are the definitions of humans and nonhumans.

into the social realm, that which has been rehearsed in the social realm and exported back to the nonhumans. Nonhumans too have a history. They are not material objects or constraints. Sociotechnical¹ is different from sociotechnical⁶ or⁷ or⁸ or¹¹. By adding superscripts we are able to qualify the meanings of a term that until now has been hopelessly confused. In place of the great vertical dichotomy between society and techniques, there is conceivable (in fact, now, available) a

range of horizontal distinctions between very different meanings of the sociotechnical hybrids. It is possible to have our cake and eat it too—to be monists and make distinctions.

All this is not to claim that the old dualism, the previous paradigm, had nothing to say for itself. We do indeed alternate between states of social and states of nonhuman relations, but this is not the same as alternating between humanity and objectivity. The mistake of the dualist paradigm was its definition of humanity. Even the shape of humans, our very body, is composed to a great extent of sociotechnical negotiations and artifacts. To conceive of humanity and technology as polar opposites is, in effect, to wish away humanity: we are sociotechnical animals, and each human interaction is sociotechnical. We are never limited to social ties. We are never faced only with objects. This final diagram relocates humanity right where we belong—in the crossover, the central column, the articulation, the possibility of mediating between mediators.

But my main point is that, in each of the eleven episodes I have traced, an increasingly large number of humans are mixed with an increasingly large number of nonhumans, to the point that, today, the whole planet is engaged in the making of politics, law, and soon, I suspect, morality. The illusion of modernity was to believe that the more we grew, the more separate objectivity and subjectivity would become, thus creating a future radically different from our past. After the paradigm shift in our conception of science and technology, we now know that this will never be the case, indeed that this has never *been* the case. Objectivity and subjectivity are not opposed, they grow together, and they do so irreversibly. At the very least, I hope I have convinced the reader that, if we are to meet our challenge, we will not meet it by considering artifacts as things. They deserve better. They deserve to be housed in our intellectual culture as full-fledged social actors. Do they mediate our actions? No, they are us. The goal of our philosophy, social theory, and morality is to invent political institutions that can absorb this much history, this vast spiraling movement, this labyrinth, this fate.

The nasty problem we now have to deal with is that, unfortunately, we do *not* have a definition of politics that can answer the specifications of this nonmodern history. On the contrary, every single definition we have of politics comes from the modernist settlement

and from the polemical definition of science that we have found so wanting. Every one of the weapons used in the science wars, including *the very distinction* between science and politics, has been handed down to the combatants by the side we want to oppose. No wonder we always lose and are accused of politicizing science! It is not only the practice of science and technology that epistemology has rendered opaque, but also that of politics. As we shall soon see, the fear of mob rule, the proverbial scenography of might versus right, is what holds the old settlement together, is what has rendered us modern, is what has kidnapped the practice of science, all for the most implausible political project: that of doing away with politics.