

**Politics of nature : how to bring the sciences into
democracy/ Bruno Latour; Cambridge: Harvard
University Press, 2004 (91-127, 266-270 p.)**

A New Separation of Powers

We are beginning to understand how to separate the wheat from the chaff in the notion of nature. It is not the *externality* of nature, by itself, that endangers public life, for it is only thanks to such an externality that public life survives: the expanding collective is constantly nourished through all its pores, all its sensors, all its laboratories, all its industries, all its skills by such a vast exterior. Without the nonhuman, humans would not last a minute. It is not the *unity* of nature, by itself, that threatens public life, either: it is normal, in fact, for public life to seek to collect the world that we hold in common, and it is normal for it to end up obtaining this world in partially unified forms. No, if we have to give up nature, it is neither because of its reality nor because of its unity. It is solely because of the short-circuits that it authorizes when it is used to bring about this unity once and for all, without due process, with no discussion, outside the political arenas, and when something then intervenes from the outside to interrupt—in the name of nature—the task of gradually composing the common world. The breach of what is called the *state of law*, a traditional concept that we are simply extending to the sciences, is what spoils any utilization of nature in politics. The only question for us thus becomes the following: How can we obtain the reality, the externality, and the unity of nature *according to due process*?

We have also understood why (political) epistemology could not be taken as a well-formed procedure, despite its high moral claims. It was gravely lacking in respect for procedures when it drew from the expression “There exists an external reality” the illogical conclusion

“Therefore, just shut up!” That so much virtue has been attached to this faulty reasoning will soon count as one of the strangest anthropological curiosities in recent times. Since there is an external reality, or rather realities, to be internalized and unified, we understand perfectly well that we have to take up the discussion again, and go on discussing for a long time. Nothing must be allowed to interrupt the procedures of assimilation before a solution has been found that will turn these new propositions into full-fledged inhabitants of an extended collective. This requirement of common sense brooks no exceptions. Only the myth of the Cave, with its improbable distinction into two houses, one of which chatters away in ignorance while the other has knowledge but does not speak, the two being connected by a narrow corridor through which, by a miraculous and double conversion, minds that are scientific enough to make things speak and political enough to silence humans go back and forth—only this myth has succeeded in making the separation between the two houses the main plot of our intellectual dramas. To be sure, abandoning the separation would bring about a dreadful catastrophe in the eyes of the epistemology police, since that would prevent Science from separating from the social world in order to accede to nature and then prevent scientists from coming back down to the world of ideas to save the social world from its misery. But this tragedy that unleashes so many passions is a tragedy only for those who have sought to plunge the collective into the Cave to begin with. Whose fault is it if Science is threatened by the rise of the irrational? It is the fault of those who have invented this implausible Constitution that makes the system so fragile that a grain of sand would suffice to block it; it is not the fault of the era, which is spilling out of this ill-conceived system on all sides—in any event, it is not the fault of those of us who have pointed out the irremediable defect in this Constitution.

Finally, the preceding chapters have allowed us to realize to what extent the official philosophies of political ecology were mistaken in their definition of procedures. In order to put an end to the diversity of political passions, they retained the principal failing of the old Constitution by requiring that the world we had in common be defined *at the outset* under the auspices of a nature known by scientists whose work remained hidden by this *Naturpolitik*. Most political ecology, at least in its theories, seeks not to change either its political philosophy

or its epistemology, but rather to offer to nature a power in the management of human affairs that the most arrogant of its older zealots would never have dared give it. The indisputable nature known by Science defined the order of respective importance of entities, an order that was supposed to close off all discussion among humans henceforth about what it was important to do and whom it was important to protect. Political ecologists have been content to give a coat of apple-green paint to the gray of the primary qualities*. Neither Plato nor Descartes nor Marx would have dared to go that far toward emptying public life of its proper forms of discussion, to short-circuit them by the incontestable viewpoint of the very nature of things in themselves, whose obligations are no longer only causal but also moral and political. It has become the disreputable job of ecological thinkers, especially those among them who claim to have broken “radically” with the “Western outlook,” with “capitalism,” with “anthropocentrism,” to bring this culmination of modernism to fruition!

Fortunately, as we have seen, ecological crises bring about more profound innovations in political philosophy than do their theoreticians, who are unable to wean themselves from the advantage offered by the conservation of nature. What might be called the “state of law of nature,” and which we now have to discover, requires quite different sacrifices and a quite different, much slower pace. The old Constitution claimed to unify the common world once and for all, without discussion and without due process, by a metaphysics of nature* that defined the primary qualities, meanwhile abandoning the secondary qualities alone to the plurality of beliefs. It is understandable that people find it hard to give up the conveniences procured by such an arbitrage between the indisputable and the disputable. The Constitution that we seek to draw up affirms, on the contrary, that the only way to compose a common world, and thus to escape later on from a multiplicity of interests and a plurality of beliefs, consists precisely in *not* dividing up at the outset and without due process what is common and what is private, what is objective and what is subjective. Whereas the moral question of the common good was separated from the physical and epistemological question of the common world*, we maintain, on the contrary, that these questions must be brought together so that the question of the *good* common world, of the *best* of possible worlds, of the *cosmos*, can be raised again from scratch.

Although each of these two Constitutions finds the requirements of the other scandalous, one cannot be deemed rational and the other irrational, for each claims to speak in the name of reason, and each defines unreason in its own way. The old form of organization considers that reason can unfurl its effects only on condition that facts be absolutely distinguished from values, the common world from the common good. If we start to confuse the two, the old form asserts, we are defenseless in the face of the irrational, since we can no longer put an end to the indefinite multiplicity of opinions through an indisputable point of view that would be exempt from any point of view. For the new form of organization, conversely, by confusing Science with the sciences and the prison of the social world with politics, that is, by refusing to take the question of the common good and that of the common world, values and facts, as a single, identical goal, one takes the terrible responsibility of prematurely interrupting the composition of the collective, the historic experimentation of reason (see Chapter 5). It is clearly difficult to imagine a more pronounced contrast: whereas the Old Regime needs to set up an opposition between the rational and the irrational in order to make reason triumph, I claim that we can achieve this end by *abstaining* from making a distinction between the rational and the irrational, by rejecting the distinction as a drug that paralyzes politics. I gladly recognize, however, that the irrational does exist: the whole framework of the old Constitution is completely unreasonable.¹

To understand to what extent the two regimes differ, we have to go straight to the heart of the matter as we approach the most difficult chapter in this book. The term "collective" does not mean "one"; rather, as I have said above, it means "all, but not two." By this term, I designate a set of procedures for exploring and gradually collecting this potential unification. The difference between the collective to be formed and the vague notions about superorganisms, the "union of man with nature," "going beyond objects and subjects," on which the philosophies of nature rely heavily, thus depends on our capacity not to rush toward unity. If dualism will not do, monism will not do either. Now, the end of Chapter 2 offered no more than a vast melting pot: the associations of humans and nonhumans that were from then on, as we saw, going to form the propositions* that the new collective has to articulate, one with another. We still have to describe the forms

that the debates must take in order to sort out these propositions, which are no longer unified by anything at all, and especially not by nature. After bringing together the collective and thus fighting the false differentiation mandated by the old Constitution, we still have to divide it up again by discovering the "right" differentiating principle, the one that will allow us to avoid the procedural shortcuts owing to which most of the decisions made according to the old separation of powers* between nature and society were illegitimate.

Some Disadvantages of the Concepts of Fact and Value

The tempting aspect of the distinction between facts and values lies in its seeming modesty, its innocence, even: scientists define facts, only facts; they leave to politicians and moralists the even more daunting task of defining values. Who would not feel the comfort in such a formulation? The bed is still warm; all one has to do is slip in and settle at once into the sleep of the just. It is from this long dogmatic sleep, however, that we have to awaken. For what reason would it be more difficult to declare what things are worth than to declare what they are?²

In order to discover a good successor to the difference between facts and values, let us examine the common use of these notions by setting up a list of specifications containing the essential requirements that its replacements will have to meet.

What is wrong with the way the word "fact" is currently used? It obliges us, in the first place, to omit the work required in order to establish the persistent, stubborn data. In the opposition between facts and values, one is obliged to limit "facts" to the final stage in a long process of elaboration. Now, if facts are fabricated, if "facts are made," as they are said to be, they pass through many other stages, which the historians, sociologists, psychologists, and economists of the sciences have struggled to inventory and categorize. Apart from the recognized matters of fact, we now know how to identify a whole gamut of stages where facts are uncertain, warm, cold, light, heavy, hard, supple, matters of concern that are defined precisely because they do not conceal the researchers who are in the process of fabricating them, the laboratories necessary for their production, the instruments that ensure their validation, the sometimes heated polemics to which they give

rise—in short, everything that makes it possible to articulate propositions.³ As a result, the use of the term “fact” without further precautions to designate one of the territories outlined by the frontier between facts and values completely obscures the immense diversity of scientific activity and obliges all facts, in every stage of their production, to become fixed, as if they had already reached their definitive state. This freeze makes it necessary to use the same words to designate a multitude of sketches, prototypes, trials, rejects, and waste products, for want of a term that makes it possible to diversify the gamut, rather as if we called all the successive stages of an assembly line “cars,” without noticing that the word designates sometimes isolated doors, sometimes a chassis, sometimes miles of electrical wire, sometimes headlights. No matter what term we choose later on to replace “fact,” it will have to highlight the process of fabrication, a process that alone makes it possible to record the successive stages as well as the variations in quality or finishing touches that depend on it; it will have to encompass matters of concern* as well as matters of fact.

The notion of fact has another, better-known defect: it does not allow us to emphasize the work of theory that is necessary for the establishment of the coherence of the data. The opposition between facts and values, in fact, unfortunately intersects with another difference whose epistemological history is very long, the opposition between theory and the data that are called, in contrast, “raw.” The philosophy of science, as we are well aware, has never been able to put forward a united front on this issue. If the respect for matters of fact appears essential to the deontology of scientists, it is no less true that an isolated fact always remains meaningless as long as one does not know of what theory it is the example, the manifestation, the prototype, or the expression.⁴ In the history of the sciences one finds as much mockery against builders of vain theories that have been overturned by some tiny bit of evidence as one finds jokes at the expense of avaricious “stamp collectors” who accumulate heaps of data that a single astute thought would have sufficed to predict. An effort to shape, form, order, model, and define seems necessary if one wants brute facts, speaking facts, obtuse facts, to be able to stand up forthrightly to those who chatter on about them. Here again, there are too many hesitations between positivism and rationalism for us to take the word “fact” as an adequate description of these multiple tasks. To our set of specifica-

tions, let us thus add that the term we need to replace the word “fact” will have to include, in addition to the stages in its fabrication, the indispensable role of *shaping* data summed up by the word “theory” or “paradigm.”⁵

Let us now move to the other side of the border. The notion of “value” has its own disadvantages. It has the pronounced weakness, first of all, of depending entirely on the *prior* definition of “facts” to mark its territory. Values always come too late, and they always find themselves placed, as it were, ahead of the accomplished fact, the *fait accompli*. If, in order to bring about what ought to be, values require rejecting what is, the retort will be that the stubbornness of the established matters of fact no longer allows anything to be modified: “The facts are there, whether you like it or not.” It is impossible to delimit the second domain before stabilizing the first: that of the facts, the evidence, the indisputable data of Science. Then, but only then, can values express their priorities and their desires. Once the cloning of sheep and mice has become a fact of nature, one can, for example, raise the “grave ethical question” whether or not mammals, including humans, should be cloned. By formulating the historical record of these traces in such a way, we see clearly that values fluctuate in relation to the progress of facts. The scales are thus not weighted evenly between someone who can define the ineluctable and indisputable reality of what simply “is” (the common world) and someone who has to maintain the indisputable and ineluctable necessity of what must be (the common good), come hell or high water.

Even if they reject this position of weakness that obliges them always to wait behind the fluctuating border of facts, values still cannot regroup in a domain that would be properly theirs, in order to define the hierarchy among beings or the order of importance that they should be granted. They would then be obliged to judge *without facts*, without the rich material owing to which facts are defined, stabilized, and judged. The modesty of those who speak “only about facts” leads astray those who must make judgments about values. Seeing the gesture of humility with which scientists define “the simple reality of the facts, without claiming in any way to pass judgment on what is morally desirable,” the moralists believe that they have been left the best part, the noblest, most difficult part! They take at face value the role of humble drudge, zealous servant, unbiased technician played by those

who limit themselves to simple matters of fact and who offer them—the moralists—the gratifying task of master and decision-maker. “Science proposes, morality disposes,” they say by common agreement, patting themselves on the back, scientists and moralists alike, the former with false modesty and the latter with false pride. But by limiting themselves to the facts, the scientists keep on their side of the border the very multiplicity of states of the world that makes it possible to form an opinion and to make judgments at the same time about necessity and possibility, about what is and what ought to be. What is left to the moralists? The appeal to universal and general values, the search for a foundation, ethical principles, the respect for procedures—estimable means, to be sure, but without a direct, detailed grasp of facts, which remain stubbornly subject to those who speak “only” of facts.⁶ The prisoners of the Cave continue to be unable to make decisions, except on hearsay. By accepting the value-fact distinction, moralists agree to seek their own legitimacy very far from the scene of the facts, in another land, that of the universal or formal foundations of ethics. In so doing, they risk abandoning all “objective morality,” whereas we, on the contrary, must connect the question of the common world to the question of the common good. How can we arrange propositions in order of importance, which is after all the goal of values, if we are not capable of knowing the intimate habits of all these propositions? In the set of specifications of the concept that will replace value, let us not forget to include the function that will allow moralists to *come closer* to matters of concern and their controversies in detail, instead of distancing themselves to go in search of foundations.

This increased familiarity will be all the more necessary in that under the current regime, once one has defined something as a matter of fact, the definition of this fact need not be reconsidered; it belongs once and for all to the realm of reality. There will thus be a strong temptation to include in the world of facts one of the values that one hopes to advance. As these little boosts are given one after another, the reality of what *is* gradually comes to include everything that one *would like to see in existence*. The common world and the common good find themselves surreptitiously confused, even while remaining officially distinct (yet without benefiting from the common organizations that we hope to discover). This paradox should no longer astonish us: far from clarifying the question, the fact-value distinction is going to be-

come more and more opaque, by making it impossible to untangle what is from what ought to be. The more one distinguishes between facts and values, the more one ends up with the *bad common world*, the one we might call, with Plato, a *kakosmos*. The concept that aspires to replace the notion of value must thus anticipate a control procedure, in order to avoid the countless little incidents of cheating through which, intentionally or not, the definition of what is possible is confused with that of what is desirable. Let us not forget to add this fourth requirement to our set of specifications.

By exploring in turn both sides of the border laid down by the venerable opposition between facts and values, we are beginning to understand that the notion of fact does not describe the production of knowledge (it neglects both the intermediate stages and the shaping of theories) any better than the notion of value allows us to understand morality (it takes up its functions after the facts have been defined and finds itself with no recourse except the appeal to principles that are as impotent as they are universal). Must we retain this dichotomy in spite of its disadvantages, or must we abandon it in spite of the danger that comes from depriving oneself of the advantages of good sense? In order to make an enlightened decision, it is important to have a grasp of the seemingly inexhaustible usefulness of the distinction between facts and values.

This distinction still has its greatest power and appears most virtuous in the form of a split between ideology and Science. In fact, those who follow the traces of the ideological influences that tarnish the factualness of the disciplines of biology, economy, history, and even physics, are major users of the fact-value distinction, since they need it to prevent the little incidents of cheating noted above, by which an axiological preference is harbored on the sly. If we were to show, for example, that immunology is entirely polluted by war metaphors, that neurobiology consumes principles of business organization in enormous quantities, that genetics conceives of planning in a determinist fashion that no architect would use to speak of his plans, we would be denouncing a number of frauds used by smugglers to conceal debatable values under the umbrella of matters of fact.⁷ Conversely, if we were to denounce the use a political party makes of population genetics, or the use novelists make of fractals and chaos, or the use philosophers make of the quantum uncertainty principle, or the use industri-

alists make of iron-clad economic laws, we would be denouncing the smugglers from the other side who hide under the name of Science and sneak in certain assertions that they dare not express openly, for fear of shocking their public, but that obviously belong to the world of preferences—that is, values.

By seeking to make a clear distinction between Science and ideology, the old Constitution sought to rectify the continually patrolled border, while avoiding two types of frauds: the one in which values are used in secret, to interrupt discussions of facts (the Lyssenko affair remains the classic model); and the one coming from the opposite direction, in which matters of fact are surreptitiously used to impose preferences that the user does not dare admit or discuss frankly (scientific racism is the most typical and best-studied example). The struggle against scientific ideology thus seems to have the advantage of purifying scientists of the political or moral pollution from which they hoped to profit; it calls them back to order and requires them to replace all the amalgams of facts and values with facts alone, nothing but matters of fact. The struggle against the ideological use of Science forbids those who discuss values to hide behind the evidence of nature, while obliging them to disclose their values, nothing but their values, without dragging the sciences into the picture, since, as they say, “What is cannot suffice to define what ought to be.”

It appears truly difficult to do without an arrangement that makes it possible to protect the autonomy of Science and the independence of moral judgments simultaneously. Unfortunately, such arrangements have the weaknesses of the dichotomy that they aim to maintain. Even if an arrangement of this sort were to achieve its aims, the most effective of all border police would succeed only in obtaining pure facts and pure values. Now, we have just demonstrated that facts define the work of the sciences as poorly as values define the task of morality. The source of the impotence of the Science-ideology distinction is thus clear: it has a laudable goal that, were it to be achieved, would not advance us one iota!⁸ The difference between Science and ideology, purity and pollution, even though it has occupied and continues to occupy a great number of intellectuals, thus does not have the efficacy that one might suppose, considering the energy spent on it, as well as the size of the police forces that patrol the border.⁹ The allegory of the

Cave obviously does not aim to separate the two houses *for good*—otherwise, facts would be mute and values would be impotent—but to transform the distinction into an impossible task that must always be started from scratch and that will turn attention away from all the others. If he ever managed to finish his task, Sisyphus would not be any further advanced.

Still, one cannot abandon an indispensable distinction under the pretext that the task in question would be insurmountable: Does not morality pride itself, after all, on maintaining its demands against all the contrary testimony of reality? We have to go further and show that this enterprise is not only impracticable but also deleterious. At first glance, however, doing without it would seem to introduce as frightful a confusion as if one were to conflate the Heaven of Ideas with the simulacrum of the Cave. “So you want to combine facts and values? Confuse scientific work with the search for moral foundations? Pollute the fabrication of facts with the social imaginary? Allow the fantasies of mad scientists to determine daily life?” If we could no longer tell facts from values, could no longer distinguish nature as it is from moral society as it should be in its indisputable search for freedom, don’t we have the distinct feeling that something essential would be lost? All the dangers of relativism where knowledge and morality are concerned would come back full force. We wouldn’t be able to tell Dolly from her clones. No, such an important touchstone certainly cannot be thrown out without good and imperious reasons.

Before exploring these reasons in the following section, let us add one more clause to our set of specifications. As we know perfectly well, it does no good to complain about the ineffectiveness of a partition without understanding that it must actually fulfill a function, just as the Great Wall of China, though it never actually prevented invasions, served the purposes of a whole series of emperors in many different ways.¹⁰ We may well suspect that the purpose of a partition so strongly rooted in good sense is not to describe anything at all. What we see as a weakness in it comes from its principal function: to make incomprehensible *the fabrication of what must be*, the progressive composition of the good common world, of the *cosmos*. Separating facts from values without ever succeeding is the only way to ensure—thanks to the power of “facts, nothing but facts”—the power of nature over

what “ought to” be. If we decide to abandon the notion of a border between facts and values, to give up the distinction between science and ideology, to stop deploying the border police and stop fighting smugglers, then in order to put minds at ease, we shall have to do *at least as well as* and, if possible, better than, the arrangement that we are abandoning. The credibility of our politics of nature is at stake. Quality control has to be maintained over both future facts and future values, whatever new meaning we may give these words—just as the French border police has to continue to maintain its control in the European space covered by the Schengen agreements even though material borders have disappeared.

Dispensing with a dichotomy and with the metaphysics that underlies it does not mean, then, that we can get rid just as easily of the requirements that were attached to this dichotomy and this metaphysics for reasons that were thought to be necessary but that are in reality only contingent. Thus we do not propose to abandon the crucial differences that are awkwardly expressed in the distinction between facts and values, but to *lodge them elsewhere*, in a different opposition between concepts, while proving that they will be better protected there. If he will only agree to modify his job description, Sisyphus will discover that his labor can become productive at last.

The Power to Take into Account and the Power to Put in Order

How can we abandon the confused distinction between facts and values, while still preserving the kernel of truth that it seems to contain, namely, the requirement of a distinction that keeps the collective from combining all propositions in the dark in which all sheep (cloned or not) look alike? In the next three sections we are going to unpack and then repackage the fact-value distinction. The solution that we have adopted for this chapter consists in untying the two packets, fact and value; in order to liberate the contradictory requirements that were unduly combined in each, then (in the following section) regrouping them differently and under another name, in much more homogeneous parcels. The operation is not an easy one, but there is no way to proceed quickly or more simply when one is trying to estab-

lish a durable new basis for common sense, while so totally opposing good sense.

The Two Contradictory Requirements Captured in the Notion of Fact

Let us first undo the packet that until now held the concept of fact, as opposed to that of value. We notice that it envelops two very different requirements. We need to know how many new propositions emerge in the discussion, and what is the well-defined essence or the indisputable nature of these propositions. When the focus is on the stubborn, troubling, recalcitrant matter of concern, two features stand out that can and must be distinguished, for they are in complete opposition: the first stresses the importance and uncertainty of discussing; the second stresses the importance of not discussing, of *no longer* discussing.

Let us start with the first one, with which the second finds itself mixed up, if not by mistake then at least by accident. The ambiguous term “fact” refers to the ability of an entity to force the discussion to deviate, to trouble the order of discourse, to interfere with habits, to disturb the definition of the pluriverse that the participants were seeking to retain. In this first sense, to use the expressions from the previous chapter, facts signal the existence of surprising actors that intervene to modify, by a series of unanticipated events, the list of mediators that up to then made up the habits of the members of the collective. That a matter of concern is recalcitrant does not in any way mean that it is objective or certain, or even indisputable. On the contrary, it agitates, it troubles, it complicates, it provokes speech, it may arouse a lively controversy. External reality, as we have seen, means two entirely different things, which we must now not only stop confusing but also file in quite distinct boxes: one referring to *complication* and the other to *unification*. Facts present themselves initially in the first form, in the laboratory, on the research front, in the garb of beings of uncertain status that demand to be taken into account and about whom one cannot say whether they are serious, stable, delimited, present, or whether they may not soon, through another experiment, another trial, scatter into as many artifacts, reducing the number of those whose existence matters. At this stage propositions do no

more, as it were, than propose their *candidacy* for common existence and subject themselves to trials whose outcome is still uncertain.¹¹ Let us say that, under the name of fact, new entities appear in the form of that which leaves those who are discussing them *perplexed**.

When we insist on the stubbornness of facts, we want to be sure that their number cannot be reduced arbitrarily, to make things easier for us and to simplify our agreement by short-circuiting discussion. When we say: "The facts are there, whether we like it or not," it is not a matter of pounding on the table to avoid social constructivism, but of pointing out something much more ordinary, less warlike, less definitive: we are trying to make sure that our interlocutors, by limiting in advance the list of states of the world, do not hide the risks that put our well-regulated existences in danger. Let us formulate this first requirement in the form of a categorical imperative: *Thou shalt not simplify the number of propositions to be taken into account in the discussion.*

What are we going to do now with the other feature that was mixed up by mistake in the same box of "facts"? It obviously does not resemble the first one in any respect, since it emphasizes on the contrary the indubitable aspect of the objective fact that closes off discussion or at least shifts the debate elsewhere, onto other topics—for example, values. Perplexity is not a stable state, nor is controversy. Once the candidacy of the new entities has been recognized, accepted, legitimized, admitted among the older propositions, these entities become states of nature, self-evidences, black boxes, habits, paradigms. No one discusses their rank and their importance any longer. They have been *registered* as full-fledged members of collective life. They are part of the nature of things, of common sense, of the common world. They are no longer discussed. They serve as indisputable premises to countless reasonings and arguments that are prolonged elsewhere. If we still pound our fists on the table, we are no longer doing so as an invitation to perplexity, but as a reminder that the "facts are there, and they are stubborn!" How can we define a matter of concern that has become such an indisputable matter of fact? Let us say that the propositions in question have been *instituted*.¹²

When we insist on the solidity of the facts, we require our interlocutors to stop challenging the states of things that now have clear boundaries, precise definitions, thresholds, fixed habits, in short, *essences**. Let us formulate this second requirement in the form of an-

other imperative: *Once propositions have been instituted, thou shalt no longer debate their legitimate presence within collective life.*

The formula may appear strange, but it will become clearer in a moment, once we have dissected the concept of value in its turn. In any case, we already understand why the packet of facts was so badly tied up: under a single wrapper it concealed two entirely different operations, one that got the discussion started and another that brought discussion to an end! It is not surprising that no one has ever understood very well what the expert meant when, in the name of "stubborn facts," he pounded his fist on the table: his gesture could signify perplexity as well as certainty, the disputable as well as the indisputable, the obligation to do more research as well as the obligation to stop doing research! Insofar as the first operation aims to multiply the number of entities to be taken into account, by maximizing the perplexity of the agents that are dealing with them, to the same extent the second aims to ensure a maximum of durability, solidity, harmony, coherence, and certainty to the assembled propositions, precisely by preventing people from splitting hairs all the time and plunging the debates back into confusion. Such was the miserable ploy of the Cave: as the same word "fact" could designate the weakest and the strongest, the most debatable and the least debatable, external reality in its emergence and external reality in its institution, matters of concern as well as matters of fact, it sufficed to combine the two terms, to jump abruptly from one to the other, in order to short-circuit all procedures and put an end to public life through the threat of a mouth-shutting reality.

The Two Contradictory Requirements Captured in the Notion of Value

Let us now undo the ties that bound together the contradictory requirements that were held captive in the concept of value. What do we mean, finally, when we assert that discussion about values has to continue, even after the facts have been defined? What do we seek to capture by the awkward expression "ought to be" that would add to "what is" its supplement of soul? What essential necessity are we struggling so confusedly to express?

By the appeal to values, we mean first of all that other propositions have not been taken into account, other entities have not been con-

sulted—propositions and entities that seemed to have a right to be heard. Every time the debate over values appears, the number of parties involved, the range of stakeholders in the discussion, is always *extended*. With the expression “But still, there’s an ethical problem here!” we express our indignation, as we affirm that powerful parties have neglected to take into consideration certain associations of humans and nonhumans; we accuse them of having put a *fait accompli* before us by making decisions too quickly, in too small a committee, with too few people; we are indignant that they have omitted, forgotten, forbidden, renounced, or denied certain voices that, had they been consulted, would have considerably modified the definition of the facts under discussion or would have taken the discussion in a different direction.¹³ To appeal to values is to formulate a requirement of prior *consultation**. We do not have on one side those who define facts and on the other those who define values, those who speak of the common world* versus those who speak of the common good*: the only real difference is between the few and the many; there are those who meet in secret to unify prematurely what is and those who demonstrate publicly that they wish to add their grain of salt to the discussion, in order to compose the Republic*. When someone complains about having forgotten a fact or a value, in every instance the complaint can be translated by a single expression: “Some voices are missing from the roll call.”¹⁴

How shall we formulate this third requirement of consultation? By the following imperative: *Thou shalt ensure that the number of voices that participate in the articulation of propositions has not been arbitrarily short-circuited*. Once again, it is in the form of an imperative that has to do with the organization of the discussion that we find the best expression of the first kernel of truth, which the notion of value had wrapped up so badly.

Let us note right away, before drawing all the consequences in the following section, that this third requirement *resembles the first one on perplexity**, that the two have a most striking family resemblance, even though tradition has placed them in different camps, dressing one in the white coat of “Science,” the other in the white toga of “values.” Both requirements concern the issue of number, for the first stresses the quantity of new beings that propose their candidacy, while

the second emphasizes the importance and quality of those who are to be seated, as it were, on the jury that will accept or reject those beings.

Let us now consider the other requirement that comes to light when one claims to be speaking about values. One cannot simply mean that a greater number of concerned parties, stakeholders, must be taken into account. The requirement of consultation by no means exhausts the content of this second packet, because the concept of value is not put together any more homogeneously than the concept of fact. To stop here would amount to limiting value to the simple requirement of maintaining forms without concern for their content, procedure without substance. There is something else here that is translated by the ever-renewed insistence on what “has” to be done, what one “ought to” be, something about the right order of priorities. This preoccupation is never well understood, because it is never heard *detached* from the one that precedes it, nor *joined* to the second categorical imperative, with which it nevertheless fits very well.

When we raise the question of values, we are not distancing ourselves from matters of concern, as if we were suddenly changing vehicles, shifting from cars to stratospheric airplanes. We are asking a *different question of the same propositions as before*: Candidates for entry into the common existence, are you compatible with those which already form our currently defined common world? How are you going to line up in order of importance? Do these propositions that come to complicate the fate of collective life in large numbers form an inhabitable common world, or do they come on the contrary to disturb it, reduce it, crush it, massacre it, render it unlivable? Can they be articulated with those which already exist, or do they demand the abandonment of the old arrangements and combinations? The requirement, as we can see, is to form a *hierarchy** among the new entities and the old, by discovering the relative importance each must be granted. It is within this hierarchy of values, this axiology, that moral aptitude has always been recognized, when it had to be decided, for instance, whether to save the child or the mother in a difficult delivery, or to be determined, as at the Kyoto conference, to what extent the health of the American economy is more or less important than the health of the earth’s climate.

We shall formulate this fourth and last requirement in the following

maxim: *Thou shalt discuss the compatibility of the new propositions with those which are already instituted, in such a way as to maintain them all in the same common world that will give them their legitimate rank.* Contrary to what the presence of this requirement in the slot reserved for values may suggest, it is *with the second* (which belonged, however, to the packet of facts), that of institution*, that it is most appropriately grouped. In order to define assured essences*, we must, before the discussion ends, be quite sure that the entities that are candidates for the establishment of the collective find their rank and place among those which are already established.

To conclude this section, let us try to summarize in tabular form the operation we have just carried out and the one on which we are about to embark. By unpacking the contradictory contents of the two concepts, fact and value, and discovering two pairs of concepts in each case, we are going to be able to regroup the essential requirements in sets that are much better formed. This new arrangement will allow us to respect the commitment we made at the end of the previous section according to which we decided to abandon the fact-value distinction, provided only that we could resituate more comfortably the crucial difference that this distinction did not manage to shelter carefully enough.

What happens if we regroup the first and third requirements under the heading *taking into account*, and if we regroup the second and fourth requirements under the heading *putting in order*? (Now that these requirements have been placed in more coherent packets, I have renumbered the essential requirements, for reasons of logic and dynamics that will become clear only in the last section.)

Instead of the old distribution of facts and values, we maintain that this new, much more logical grouping makes it possible for two new powers to emerge. The first answers the question "How many are we?" and the second answers the question "Can we live together?" (Box 3.1).

The Collective's Two Powers of Representation

We have just traversed one of the four or five most difficult passages of our itinerary, but there was no way to avoid this effort, since the distinction between facts and values had for a very long time paralyzed

Box 3.1. Recapitulation of the two forms of power and the four requirements that must allow the collective to proceed according to due process to the exploration of the common world.

POWER TO TAKE INTO ACCOUNT: HOW MANY ARE WE?

First requirement (formerly contained in the notion of fact): You shall not simplify the number of propositions to be taken into account in the discussion. Perplexity.

Second requirement (formerly contained in the notion of value): You shall make sure that the number of voices that participate in the articulation of propositions is not arbitrarily short-circuited. Consultation.

POWER TO ARRANGE IN RANK ORDER: CAN WE LIVE TOGETHER?

Third requirement (formerly contained in the notion of value): You shall discuss the compatibility of new propositions with those which are already instituted, in such a way as to maintain them all in the same common world that will give them their legitimate place. Hierarchization.

Fourth requirement (formerly contained in the notion of fact): Once the propositions have been instituted, you shall no longer question their legitimate presence at the heart of collective life. Institution.

all discussion on the relations between science and politics, between nature and society. Now we need to understand the logic of these new aggregates, which have become, in my view, much more comprehensible, homogeneous, and logical, and which we are going to be able to use throughout the rest of this book. To be sure, the terms we are going to adopt in this section will seem a bit strange. This is because they do not have the benefit of long use; they have not become conceptual institutions, forms of life, forms of the new common sense. Just as, for years after the fall of the Berlin Wall, East Germany and West Germany are still recognized even though they are now part of the same nation, in the same way we shall often have the impression that the words we are going to pair up would be more at ease if we separated them once again, or, conversely, that the words we have separated would do better together. Readers will have to accept this strangeness, nevertheless, and judge, one chapter at a time, whether the new separation of powers is not highly preferable to the old.

The four essential requirements form two coherent sets, something

that would have been obvious a long time ago if the fact-value distinction had not been in place to disturb their coupling. The first set answers just one question: *How many new propositions must we take into account in order to articulate a single common world in a coherent way?* Such is the first power that we seek to recognize in the collective.

The power to take into account brings two *essential guarantees*, one coming from the old facts and the other from the old values. First, the number of candidate entities must not be arbitrarily reduced in the interests of facility or convenience. In other words, nothing must stifle too quickly the perplexity into which the agents find themselves plunged, owing to the emergence of new beings. This is what could be called the *requirement of external reality**—there is no reason not to use those words now that the words “reality” and “externality” have been freed of the poison of (political) epistemology. Second, the number of those which participate in this process of perplexing must not itself be limited too quickly or too arbitrarily. The discussion would of course be accelerated, but its outcome would become too easy. It would lack broader consultation, the only form capable of verifying the importance and the qualification of the new entities. On the contrary, it is necessary to make sure that reliable witnesses*, assured opinions, credible spokespersons have been summoned up, thanks to a long effort of investigation and provocation (in the etymological sense of “production of voices”).¹⁵ Let us call this constraint the *requirement of relevance*, to remind us that all the relevant voices have been convoked.

The second set answers another question: *What order must be found for the common world formed by the set of new and old propositions?* Such is the second power, which we call the power to put in order.

Two essential guarantees ensure a satisfactory answer to this question. First, no new entity can be accepted in the common world without concern for its compatibility with those which already have their place there. It is forbidden, for example, to banish all the secondary qualities* by an ultimatum, on the pretext that one already possesses the primary qualities* that have become, without due process, the only ingredients of the common world.¹⁶ An explicit work of hierarchization through compromise and accommodation makes it possible to take in, as it were, the novelty of the beings that the work of taking into account would risk multiplying. Such is the *requirement of publicity* in the ranking of entities, which replaces the clandestinity

Box 3.2. Vocabulary selected to replace the terms “facts” and “values”

POWER TO TAKE INTO ACCOUNT: HOW MANY ARE WE?

Perplexity. Requirement of external reality.

Consultation. Requirement of relevance.

POWER TO ARRANGE IN RANK ORDER: CAN WE LIVE TOGETHER?

Hierarchy. Requirement of publicity.

Institution. Requirement of closure.

permitted by the old notion of nature. Second, once the discussion is closed and a hierarchy established, the discussion must not be reopened, and one must be able to use the obvious presence of these states of the world as indisputable premises for all the reasoning to come. Without this requirement of institution, the discussion would never come to an end, and one would never succeed in knowing in what common, self-evident, certain world collective life ought to take place. Such is the *requirement of closure** of the discussion.

To make this clearer, Box 3.2 summarizes the terms we propose to introduce.

Before going further, let us note that with the new separation of powers and these four questions, we are not introducing any dangerous innovation: we are only describing more concisely what the impossible fact-value distinction sought to make indescribable. Let us take the example of prions, those unconventional proteins that appear responsible for the so-called mad cow disease. It is useless, as we now understand, to require scientists to prove definitively that these agents exist, so that politicians can then seriously raise the question of what they ought to do. At the beginning of the mad cow affair, M. Chirac, the French president, initially summoned M. Dormont, a specialist in those tiny beings: “Accept your responsibilities, Dr. Dormont, and tell us whether or not prions are responsible for the disease!” To which the professor, as a good researcher, responded coolly: “I accept my responsibilities, Mr. President. My answer is that I don’t know . . .” Objects of a vigorous controversy, prions suffice to induce perplexity—requirement no. 1—not only among researchers, but also among cattle

farmers, Eurocrats, consumers, and producers of animal-based feed, not to mention cows and prime ministers. Candidates for existence, prions bring with them all the external reality necessary to stir up the collective. The only thing they no longer bring—but no one asks it of them any longer, except inveterate modernists like M. Chirac—is the capacity to silence the collective with their indisputable essence. From this point on, they are waiting to gain this essence* from a procedure that is under way.

Who is to judge these prions, candidates for a durable and dangerous existence? Biologists, of course, but also a large assembly whose composition must be ensured by the slow search for reliable witnesses capable of forming a voice that is at once hesitant and competent—requirement no. 2, relevance of the consultation. This search for good spokespersons is going to necessitate a rather complicated course of action as well for veterinarians, cattle farmers, butchers, and government employees, not to mention cows, calves, sheep, and lambs, who must all be consulted, one way or another, according to procedures that have to be reinvented every time, some coming from the laboratory, others from political assemblies, a third group from the marketplace, a fourth from government, but all converging in the production of authorized or stammering voices. It is clear that the power to take into account is translated into a sort of state of alert imposed on the whole collective: laboratories do research, farmers investigate, consumers worry, veterinarians point out symptoms, epidemiologists analyze their statistics, journalists probe, cows mill about, sheep get the shakes.¹⁷ It is critical not to bring this general alert to an end too soon by assigning stable facts to the common world of external nature and putting the multiplicity of opinions in the social world, as if this world could be equated with the more or less irrational representations that humans make of it. If there is one thing that must not be reintroduced artificially in this business, it is precisely *the good-sense distinction between facts and values!*

Still, there is no need to mix everything up: the new separation of powers is going to manifest its relevance by making the collective undergo an operation that would be illicit in the power to take into account* but that will take on its full meaning with the power to put in order*. The *same* heteroclit and controversial assembly of prions, farmers, prime ministers, molecular biologists, and beef-eaters is now

going to find itself in the grip of a second power that must of course stabilize the controversy, bring an end to the agitation, and calm the states of alert, but on condition that it not use the old manner, which has now been rendered unconstitutional. It is especially important not to impose an artificial distinction between facts and values, which would necessitate distributing the indisputable and the disputable arbitrarily, by inviting the government to close the discussion with its arbitrage—its arbitrariness.

It is appropriate to ask instead a completely different question: Can we live with these controversial candidates for existence, these prions? A third requirement—no. 3, the requirement of publicity of hierarchy—comes up now. Must all European cattle farming be modified, the entire meat distribution system, all manufacturing of animal-based feed, in order to make room for prions and situate them within an order that will array them from largest to smallest? It is no longer a matter of an ethical question that would come “in the wake” of a now-established question of fact. Only an intimate familiarity with the controversy over the existence of these candidates—a controversy that is still going on and for whose conclusion we no longer need to wait—makes it possible to measure the importance of the changes required simultaneously in consumers’ tastes, the imposition of quality labels, the biochemistry of proteins, the shepherders’ conception of epidemics, the three-dimensional modeling of proteins, and so on.¹⁸ To this question about relative importance, there is no ready-made answer.¹⁹ After all, automobiles kill eight thousand innocent victims every year in France: no tenderloin has killed more than a few French meat-eaters so far, and even these cases are in doubt. How can we arrange in order of importance the beef market, the future of Professor Dormont, the slaughter caused by automobiles, the taste of vegetarians, the income of my farmer neighbors in the Bourbonnais region, the Nobel Prize awarded in 1997 to Professor Stanley E. Prusiner, one of the discoverers of prions? Does the list sound too heterogeneous? Too bad—it is indeed this power to establish a hierarchy among incommensurable positions for which the collective must now take responsibility. We cannot homogenize the voices that participated in the power to take into account, any more than we can avoid seeking to homogenize those which participate in the power to put in order.

By definition, the power of arranging cannot purify propositions by

listing them in advance in the categories of “fact” or “value.” It has to come to terms with this diversity and bring it to an end through a painful series of adjustments and negotiations. The escape route of “matters of fact” is no longer possible. There no longer exists any help from the outside that could simplify the solution, neither that of nature nor that of violence, neither right nor might. When the solution is eventually found (as seems to be the case for the eight thousand French automobile deaths!), all the propositions that connect the prion, Creutzfeldt-Jakob disease, the meat-distribution system, and the theories of infectious diseases will be stabilized and will become bona fide members of the collective—requirement no. 4 of closure of the institution. Their presence, their importance, their function will no longer be subject to discussion. The prion and its attachments will henceforth have an essence* with fixed boundaries. Their descriptions will be found in manuals. Victims will be indemnified. Causalities and responsibilities will have been apportioned through an operation that could be called cause attribution, if we agreed to use this expression to cross scientific *causalities* with juridical *accusations*.²⁰ The prion and its entourage will have been completely internalized, the collective having changed profoundly, now that it is composed of—in addition to all the entities that it accepted heretofore—prions responsible for diseases that are dangerous for humans and animals, and that could be avoided if the production of animal-based meal and the conditions of slaughter were modified. The prion will have become *natural*: there is now no reason to deprive ourselves of that adjective, which is very convenient for designating, on a routine basis, full-fledged members of the collective.

By requalifying in our own terms the mad cow episode, so typical of the matters of concern* whose proliferation cracked the narrow framework of the old Constitution, we have not lost sight of the essential demands of reality, relevance, publicity, and closure: they are all present; only the “self-evident” difference between facts and values is missing from the roll call, only the indisputable externality of a prion that has always already been there. But this addition would add neither clarity nor morality; it would add only confusion. More precisely, it would add a *facileness*, an arbitrariness, a short-circuit, a shortcut, by allowing a proposition to jump directly from perplexity to institution,

		OLD BICAMERALISM	
		House of nature Facts	House of society Values
First house: taking into account		Perplexity 1	Consultation 2
Second house: arranging in rank order		Institution 4	Hierarchy 3

NEW BICAMERALISM

Figure 3.1 After a ninety-degree reversal, the fact-value distinction becomes the distinction between the powers of taking into account and the powers of arranging in rank order.

something that the new separation of powers is precisely designed to prohibit.

If we look at Figure 3.1, we see that we have substituted a new form of bicameralism* for the two houses of the old Constitution.²¹ There are still two houses, as in the old Constitution, but they do not have the same characteristics. By imposing a ninety-degree shift on the important difference that previously divided fact from value, we have modified not only the composition of the compartments, which are grouped in rows instead of lined up in columns, but also the *functioning* of this difference.²²

The distinction between facts and values was at once absolute and impossible, as we saw above, since it refused to be construed as a separation of powers and claimed to be inscribed in the nature of things, distinguishing ontology on the one hand from politics and its representations on the other. The second difference between the question of taking into account and that of ordering has nothing absolute about it, *but nothing impossible, either*. On the contrary, it corresponds to the two complementary requirements of collective life: How many of you

are there to take into account? Are you able to form a good common life? The fact that these two questions must be carefully distinguished does not prove that a border police, similar to the one that patrolled the old border between Science and ideology in vain, has to be put in place. It is enough simply that the discussion about the common world not be constantly interrupted by the discussion about the candidates for existence, and that discussion of the new entities not be constantly suspended on the pretext that one does not yet know to what common world they belong. Instead of an impossible frontier between two badly composed universes, it is rather a matter of imagining a *shuttle* between two arenas, between the two houses of a single expanding collective. The administrators in charge of this separation of powers (whose own powers we shall discover in Chapter 5) will surely have to be vigilant, but they will not have the impossible task of being customs officers and smugglers at the same time.

Verifying That the Essential Guarantees Have Been Maintained

We cannot conclude our effort at untangling and repackaging facts and values without verifying that we have indeed fulfilled the set of specifications to which we committed ourselves in the first section. I said, in effect, that the fact-value distinction, apart from its role as short-circuit, which we obviously are not going to maintain (against which, on the contrary, we are going to have to learn to struggle), also accomplished several other tasks that were mixed in together for contingent reasons. Let us recall in Box 3.3 what we agreed to accept on our own account, while abandoning the notion of fact, then that of value, then the distinction between the two.

We have definitely fulfilled the first clause. The work of fabrication of facts is no longer reduced to its last stage, now that we are allowing the articulation of propositions in the successive states of their natural history to emerge, from the appearance of candidate entities to their incorporation into the states of the world. Instead of defining the facts by the suspension of all controversy, all uncertainty, all discussion, we can now define them, on the contrary, through the quality of a procedure that involves any new entity in a series of successive arenas. It is

Box 3.3. Summary of the specifications that the successor to the fact-value distinction has to respect.

1. The notion that replaces that of fact has to include the successive stages of fabrication.
2. The notion that replaces that of fact has to include the role of the shaping responsible for its stabilization.
3. The notion that replaces that of value has to allow the triage of propositions, while paying close attention to the facts in detail rather than turning the attention to foundations or forms.
4. The notion that replaces that of value has to guarantee against the cheating that causes values to be disguised as facts and facts to be disguised as values.
5. The notion that replaces the fact-value distinction has to protect the autonomy of the sciences and the purity of morality.
6. The notion that replaces the fact-value distinction has to be able to ensure a quality control at least as good as, and if possible better than, the one that is being abandoned, concerning both the production of facts and the production of values.

useless to repress, hide, or play down the importance of controversies, the mediation of instruments, the cost of knowledge, and the clamor of disputes. We have installed controversies at the heart of collective activity, without worrying about whether they are nourished by the usual uncertainty of research or by the debates proper to representative assemblies.²³ When new entities are involved, there is always lively discussion. As we are no longer in a hurry to crush under the little word "fact" the countless configurations under which the new entities participate in collective life, we shall have all the space we need for them to unfold at leisure. I do not claim that this exercise will be easy, but simply that we shall be able to fulfill this item in the specifications set.

I also believe that we can fulfill the second clause fairly readily. The notion of "fact," let us recall, had the disadvantage of not taking into account the enormous work of shaping, formatting, ordering, and deducing, needed to give the data a meaning that they never have on their own. Tradition in the philosophy of the sciences gives this work the name "theory." A lovely euphemism that has come straight down from the Heaven of Ideas to illuminate the Cave! The word we have

chosen, that of institution*, allows us to do much more justice to *the whole set of mechanisms for attributing shape and distributing causalities* through which a new entity becomes a legitimate and recognized member of public life. The word “theory,” in contrast, limits too severely the number of agents responsible for the regrouping and stabilization of the facts.²⁴ Instruments, bodies, laws, habits, language, forms of life, calculations, models, metrology, everything can contribute to the progressive socialization and naturalization of entities, without any need to distinguish in this list between what might belong to the old universe of the “sciences” and what seems to depend on the old domain of the “political.”

Thus we believe we are capable of doing justice to the work of shaping and stabilizing, all the more so because, as we saw in Chapter 1, we have abandoned the notion of social representation that made it impossible, earlier, to give a positive meaning to the term “institution.” The notion of articulation* allows us to connect the quality of reality to the quantity of work supplied. We do not have the pluriverse on one side and the ideas humans hold about it on the other. When an entity becomes a state of the world, this does not happen in appearance and *in spite of* the institutions that support it, but “for real” and *thanks to* the institutions. This solution, impossible before the development of the sociology of the sciences and political ecology, has become the key to our effort at elucidation. We are thus going to be able to bring back into the collective all the *variations in degree* in the production and progressive diffusion of a certainty that the fact-value distinction managed only to crush into a single opposition between knowledge and ignorance.²⁵

We have already explained our position on the third clause, since we proposed to shift the normative requirement from foundations to the details of the deployment of matters of concern. Still, as proof will not be provided before the next chapter, let me leave this point aside for the moment. Let us simply prepare ourselves to modify the role of the moralist as much as that of the scientist, the politician, the administrator, or the citizen.

Let us now turn to the fourth clause, seemingly more difficult to fulfill. The only justification for the fact-value distinction was to prevent the double smuggling through which unscrupulous rascals caused their partisan preferences to be taken for ineluctable states of nature

or, conversely, used purported states of nature to avoid having to explain clearly the values to which they wanted people to cling. By abandoning the fact-value distinction, we committed ourselves to do *at least as well* as it had done, placing ourselves in the same situation as the European Union, for which the abandonment of national frontiers must not have the effect of reducing territorial security. As we see at a glance from Figure 3.1, we have had very little trouble doing better: no one can accuse us of diminishing the discussion or short-circuiting quality control! On the contrary, laid end to end, the four imperatives require that we not bring an end to perplexity too abruptly, that we not unduly accelerate the consultation, that we not forget to look for compatibility with established propositions, and finally that we not register new states of the world without an explicit motivation. It is true that at this stage, not having sufficiently retooled the “job description” of the scientist, the politician, the administrator, and the economist, I still cannot show that the virtue of a trajectory of exploration will make it possible to do much better than the difference between science and ideology. Readers will have to wait for me, then, on this crucial point, and they will be right to be suspicious until I have shown, in the following chapter, that the guarantees I offer are better than those I am asking readers to abandon.

The fifth item of the set of specifications is easier to fulfill, but more difficult to prove. If by “defense of the autonomy of science” and “purity of morality” we mean two spheres protected against all interference, it goes without saying that we are incapable of satisfying that condition. Such is precisely the misunderstanding that gave rise to the “science wars.” We must make common sense accustomed to what should have always been obvious: the more we interfere with the production of facts, the more objective they become, and the more the normative requirement gets mixed up with matters of concern, the more it will gain in quality of judgment. Still, we can guarantee that there are indeed two powers that must definitely not be mixed: the power to take into account the number of entities and voices, on the one hand, and the will of these entities and voices to form a common world, on the other hand. Something essential would be lost if the work of taking into account* were shortened, trampled on, or encroached upon by the work of putting in order*, and if the work of putting in order were begun anew, interrupted, or called back into

question by the work of taking into account. Behind the clause from the set of specifications that is impossible to carry out—the requirement to defend the autonomy of science and the purity of morality—there is thus an essential function to be conserved, but one that we have to displace in order to shelter it elsewhere. Far from resembling the impossible search for purity, it makes us think rather of the shuttle required by this new bicameralism between the two houses that must at once counterbalance each other and coordinate with each other, without getting mixed up in each other's affairs. This task will be the heart of the constitutional work of political ecology.

If anyone hesitates to certify our position on the last of the clauses, it is important to recall the extraordinary confusion in which the unrealizable distinction between facts and values ends up in practice. It will be clear that by passing from one Constitution to the other, we are not introducing chaos into a regime that was well ordered up to now. On the contrary, we are bringing just a little bit of logic into a situation of frightful disorder.

Before we are accused of "relativism," on the pretext that we would be calling for a confusion between facts and values, let us recall the incoherence of the Old Regime, which never managed to achieve this distinction, even though it struggled tirelessly to do so—without wanting to succeed, moreover, since the real distinction between facts and values would have deprived it of any possibility of defining the good common world in its own way and on the sly.

In this confusion, everybody loses. The scientist, who is sometimes asked to be absolutely certain, sometimes to plunge into controversies, but without being given the legitimate means to move from perplexity to hierarchy. The moralist, who is asked to arrange entities in order of importance but who is deprived of any precise knowledge of these entities and of all the work of consultation. The politician, who has to decide, he is told, but who is not given access to the research front and thus has to decide in the dark. It will be said that he has the people with him. Ah, but how many crimes have been committed in the name of the people? Like the ancient chorus, the people is supposed to punctuate with its low voice, its lamentations, its wise proverbs, the agitation of those who claim to be consulting, educating, representing, conducting, measuring, satisfying it. If the public is consulted nonetheless, it is in the derisory form of "public participation

in decision-making." If the public has to know, it is in the mode of informing, divulging, popularizing, vulgarizing.²⁶ The public is not asked to go into the laboratory and become perplexed in its turn. If it is told about institutions, the purpose is to lock it up in the prison of its own social representations, the better to subjugate it with the chains of naturalization and the ineluctable laws that are going to shut its mouth. If anyone offers to hierarchize its values, it will be deprived of all access to the details of the facts, to all the living fire of controversy, to all the uncertainty of the collective. No, there is no question about it, every unprejudiced mind that casts a glance on this profound confusion that is called "society's debates over science and technology" can only conclude as I have: it must be possible to do a bit better than this! Provided, nevertheless, that to the four requirements we have just developed a dynamic is added that allows them to be better understood.

A New Exteriority

More than this one meticulous chapter would be needed, as I am well aware, to bring about the abandonment of the venerable distinction between facts and values. Indeed, if people are so fond of this distinction, which is as awkward as it is absolute, it is because it seems at least to guarantee a certain transcendence over the redoubtable immanence of public life.²⁷ Even in recognizing that it is inapplicable, one would like to preserve it against the supreme danger that would come from doing without it: one could find oneself defenseless before the reduction of all decisions within the narrow limits of the collective confused with the Cave. Without the transcendence of nature, which is indifferent to human passions, without the transcendence of moral law, which is indifferent to the objections of reality, and without the transcendence of the Sovereign, which is always capable of deciding, there seems to be no further recourse against the arbitrariness of public life, no court of appeals.

If one maintains the distinction between the common world* and the common good* against all odds, it will be to hold on to this reserve that is going to make it possible to rise up in indignation, either by taking from nature the courage to struggle against opinion, or by turning to incontestable values in search of something with which to

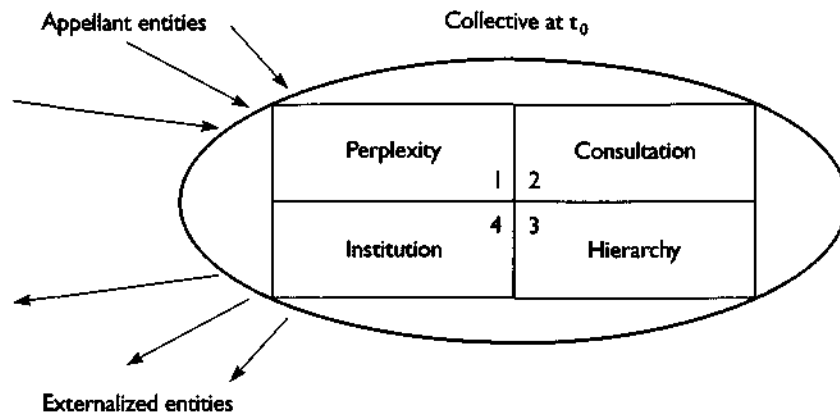


Figure 3.2 The collective is defined only by its movement: the entities thrown out by the power of rank ordering return as appellants, in the next iteration, to "trouble" the power of taking into account.

struggle against the simple states of nature, or else, finally, by asking the indisputable will of the Sovereign to decide against everything and everyone. I shall succeed in restoring the confidence of my readers, deprived of the distinction between facts and values, only if I can make them see for themselves, at the end of this chapter, that for political ecology there is another transcendence, another externality, which owes nothing either to nature or to moral principles or to the arbitrariness of the Sovereign.²⁸

Although this exteriority does not have the grandiose and formidable aspect of the three courts of appeal to which the old Constitution had entrusted the task of saving public life, it has the great advantage of being easy to find, provided that we agree to extend the work of the collective a bit. I maintain that I am replacing the difference between the common world and the common good with the simple difference between *stopping* and *continuing* the movement of the progressive composition of the good common world (according to the definition given for politics*). Let us take a look at Figure 3.2.

The preceding section did not trace the dynamics of the entire collective, but only one cycle of its slow progression, its painful explora-

tion. What I did was like explaining the successive phases of a combustion engine: but we still have to get the engine started. Every new proposition first goes through the four compartments of this figure, responding in turn to each of our essential requirements: it induces perplexity in those who are gathered to discuss it and who set up the trials that allow them to ensure the seriousness of its candidacy for existence; it demands to be taken into account by all those whose habits it is going to modify and who must therefore sit on its jury; if it is successful in the first two stages, it will be able to insert itself in the states of the world only provided it finds a place in a hierarchy that precedes it; finally, if it earns its legitimate right to existence, it will become an institution, that is, an essence, and will become part of the indisputable nature of the good common world. Such are the various phases of one cycle.

But the movement of composition cannot stop there, because the collective still has an outside! If the old Constitution required a constant classification of the provisional results of history in the two opposite compartments of ontology or politics, the same is not true of the new Constitution. The distinction between facts and values did not allow change to be registered, since matters of fact, by definition, were always already there: if there was actually a history of their discovery by humans, there was no historicity proper to nonhumans.²⁹ Although the composition of the actors of the pluriverse did not stop changing, the old Constitution registered the continuous variation in the positions only as a succession of surreptitious revolutions in the composition of the common world. Nature changed metaphysics without anyone's ever understanding what sleight of hand brought this about, since it was supposed to remain, as the name indicates, *anterior* to any metaphysics. The same is not true of the new Constitution, which has precisely the goal of following in detail the intermediary degrees between what is and what ought to be, registering all the successive stages of what I have called an experimental metaphysics*. The old system allowed shortcuts and acceleration, but it did not understand dynamics, whereas ours, which aims at slowing things down and fosters a great respect for procedures, does allow an understanding of movement and process.

Let us recall that the collective does not yet know according to what

criteria it is to articulate its propositions. It only knows—such is our hypothesis—that the propositions cannot be arranged in two sets constituted without due process. At a given moment—let us call it t_0 —we find it completing its first cycle by instituting a certain number of essences. Very well, but that also means that it *has eliminated other propositions*, being unable to make room for them in the collective. (Let us recall that we no longer have at our disposal the premature totalization of nature that we could use as a supreme court of appeal.) Of these excluded entities we cannot yet say anything except that they are exteriorized or externalized*: an explicit collective decision has been made *not* to take them into account; they are to be viewed as insignificant. This is the case, in the example given earlier, of the eight thousand people who die each year from automobile accidents in France: no way was found to keep them as full-fledged—and thus living!—members of the collective. In the hierarchy that was set up, the speed of automobiles and the flood of alcohol was preferred to highway deaths. Even if this may appear shocking at first glance, no moral principle is superior to the procedure of progressive composition of the common world: for the time being, the rapid use of cars is “worth” much more in France than eight thousand innocent lives per year. About this choice, there is *nothing* we can say, yet. In contrast, a gradient is going to be established between the interior of the collective and its exterior, which will gradually fill up with excluded entities, beings that the collectivity has decided to do without, for which it has refused to take responsibility—let us remember that these entities can be humans, but also animal species, research programs, concepts, any of the rejected propositions* that at one moment or another are consigned to the *dumping ground* of a given collective. We no longer have a society surrounded by a nature, but a collective producing a clear distinction between what it has internalized and what it has externalized.

Still, nothing proves that these externalized entities will always remain *outside* the collective. They no longer have to play, as they did in the old scenography of facts and values, the obtuse role of a thing in itself, of stupid matters of fact, nor the role—as vague as it is estimable—of transcendent moral principle. So what are the entities that have been set aside going to do? They *are going to put the collective in danger*, always provided that the power to take into account is sensi-

tive and alert enough. What is excluded by the power to put in order* at t_0 can come back to haunt the power to take into account at $t + 1$ —I shall return to this dynamic in Chapter 5. Such is the feedback loop³⁰ of the expanding collective, a loop that makes it so very different from a society* endowed with its representations, in the midst of an inert nature made up of essences whose list would be fixed once and for all, expecting from moral values a salvation from on high so it can extricate itself from mere matters of fact. All the transcendence one needs, in practice, to escape from the straitjacket of immanence is found there, on the outside, within reach.

In the new Constitution, what has been externalized can *appeal* and come back to knock at the door of the collective to demand that it be taken into account—at the price, of course, of modifications in the list of entities present, new negotiations, and *a new definition of the outside*. The outside is no longer fixed, no longer inert; it is no longer either a reserve or a court of appeal or a dumping ground, but it is what has constituted the object of an explicit procedure of externalization.³¹

In considering the succession of stages, we understand why the fact-value distinction could not be of any use to us, and why we were right to abandon it, at the price of a perhaps painful effort. All our requirements have the form of an imperative. In other words, they *all* involve the question of what *ought* to be done. It is impossible to begin to ask the moral question *after* the states of the world have been defined. The question of what ought to be, as we can see now, is not a moment in the process; rather, it is coextensive with the entire process—whence the imposture there would be in seeking to limit oneself to one stage or another. Symmetrically, the famous question of the definition of facts is not reduced to just one or two stages but is distributed through all the stages. Perplexity counts as much for this question as the relevance of those who are brought in to judge it, as the compatibility of the new elements with the old, to end up with the act of institutionalizing that provisionally finishes giving it an essence with clear boundaries. Whence the awkwardness that consisted in reducing the definition of facts to just one stage of the process.

If one wished at all costs to maintain the distinction between what is and what ought to be, one could say that it is a matter of traversing the whole set of stages *twice*, by asking two distinct questions of the

same propositions, subject to each of the four requirements: *What discussion procedure must be followed? What is the provisional result of the discussion?* Behind the false distinction between facts and values was hidden an essential question about the *quality* of the procedure to be followed and about the *outline* of its trajectory, a question now liberated from the confused quarrel that (political) epistemology sustained with ethics.³²

Readers will probably notice that I have *replaced* the fact-value distinction with another one that is no less clear-cut and no less absolute, but which cuts across the other and is in a way superior to it. I am not speaking of the “shuttle” between taking into account* and putting in order*, but of the much more profound difference between, on the one hand, the short-circuit in the composition of the common world and, on the other, the slowing down that is made possible by *due process*, which I have chosen to call representation*. I have nothing in principle against dichotomies. On the contrary, I do not hesitate to make this profound contrast between *acceleration* and *representation* play a central normative role. This is the source from which we are going to draw our indignation and our legal and moral standing. “Represent rather than short-circuit,” such is the goal of political ecology. As I see it, there is a reserve of morality here that is much more inexhaustible and much more discriminating than the vain indignation whose goal was to prevent the contamination of values by facts or of facts by values.

At the beginning of this chapter, I was looking for a way to obtain the reality, the externality, and the unity of nature through due process. At the end of the chapter, we know, at least, that we are not confronting an impossible task. We simply have to modify our definition of externality, since the social world does not have the same “environment” at all as the collective: the former is definitive and made up of a radically distinct material; the second is provisional and produced by an explicit procedure of exteriorization. When a member of the old Constitution looked outside, she was looking upon a nature made up of objects indifferent to her passions, to which she had to submit or from which she had to tear herself away. When we look outside, we see a whole still to be composed, made up of excluded entities (humans and nonhumans) in whom we have explicitly decided not to be interested, and of *appellants* (humans and nonhumans) who demand

more or less noisily to be part of our Republic. There is nothing left of the old metaphysics of nature, nothing left of the old allegory of the Cave, although everything that matters to public life remains: reality—the nonhumans and their cohorts; externality—produced according to the rules and no longer surreptitiously; unity—the progressive unity of the collective in the process of exploration; to which it suffices to add the procedures for discussion that we must now make explicit.

Where does “external nature” now lie? It is right here: carefully naturalized, that is, socialized right inside the expanding collective. It is time to house it finally in a civil way by building it a definitive dwelling place and offering it not the simple slogan of the early democracies—“No taxation without representation”—but a riskier and more ambitious maxim—“No reality without representation!”

trol of the primary qualities. Concerning the same period, we can contrast Koyré's treatment (Koyré 1957) with that of a political epistemologist, in Shapin 1996.

3. A New Separation of Powers

1. The science wars, from this standpoint, are not lacking in a certain grandeur. I would join the camp of the "Sokalists" right away if I heard someone calmly proclaim that the sciences are one "system of beliefs" among others, a "social construction" without any particular validity, an interplay of political interests in which the strongest wins (positions that are usually attributed to me by people who have not read my work!). "That means war!" as Isabelle Stengers reminds us (Stengers 1998), and there is good reason to fight to prevent this extension of the obscurantism of the Cave to the Enlightenment. Still, the battle I am waging has a different aim: to keep anyone from depriving us of light by burying us in the inner reaches of the Cave, only to dazzle us later on with a projector that can only burn our retinas.

2. For a telling critique of the anthropomorphism implied in the notion of matters of fact, see Tarde 1999, repr., 44.

3. On the vascularization necessary for facts to exist, one could consult the whole of science studies from Fleck 1935 to Rheinberger 1997. Let us not forget that Science and the sciences do not have the same feeding habits: whereas Science is weakened by any trace of construction, the sciences are nourished by the work of fabrication allowed by laboratories. I am well aware that the theme of fabrication or the construction of facts necessitates a profound transformation of the notion of fabrication itself (Hacking 1999). I have attempted this myself several times, particularly in Latour 1999b, Latour 1999c, and again in Latour forthcoming.

4. The essential elements of this lengthy quarrel against empiricism, which Pierre Duhem made classic (Duhem 1904), can be found in Bachelard 1951 as well as in Popper and Kuhn.

5. We shall understand only at the end of Chapter 4 why these two terms are synonymous, even if the traditional dispute between the internal and external histories of science presents them as separated; see Pestre 1995. This separation, whose history Steven Shapin has studied (Shapin 1992), is actually just an artifact of the old Constitution.

6. Habermas (1996) attempts to find an intermediary between facts and values in the notion of norms. Like many of his solutions, this one has the disadvantage of retaining the defects of the traditional concepts, even as it finds astute social means to alleviate them. To discover the "procedural rationality" that is appropriate to political ecology (see Chapter 5), we must thus avoid the solution offered by the notion of the norm and dig deeper, in order not to retain the difference, consecrated by Habermas, between instrumental reasoning concerned with means and communicative action, which would be concerned with ends (Latour 2002a).

7. See for example the useful update on the discourses of genetics in Fox-Keller 2000.

8. This is why the distinction introduced in Chapter 1 between Science* and the sciences* owed nothing to this hope of purifying Science of any trace of ideology.

"Pure and autonomous" Science is still more remote from the sciences as they are practiced than is Science polluted by ideology.

9. Bachelard probably should be credited for the amount of energy devoted in France to washing the sciences clean of any trace of contamination through an "epistemological break" that always has to be begun anew, a constant battle against the "epistemological obstacles" that common sense, always mistaken, multiplies to suit itself (Bachelard 1967). See also Georges Canguilhem's tireless efforts to purge the sciences of all their ideological adhesions, in Canguilhem 1988 (1968). Some prefer to forget this today, but during Althusser's era people went so far as to try to purge Marx's Science of its ideology. In this tradition, rationality is exercised only through a continual asceticism that separates it from what makes it exist. We can understand how difficult it is to found a Republic* with such an epistemology of combat.

10. On this work of art, see Waldron's fascinating book (Waldron 1990).

11. Let us recall that a proposition* is not a term from linguistics; it designates the articulation through which the world is invested in words. A river, a black hole, and a fly fisherman's union, as well as an ecosystem or a rare bird, are propositions. They are all similarly made of a still uncertain mixture of entity and speech.

12. For the time being, I shall use the term "institution" in a trivial sense. It will become clearer later on. At the risk of being tiresome, I should like to recall that for the practice of the sciences (and thus for the sociology of the sciences), "institution" is not a negative term but a positive one (Fleck 1935); the more the sciences are instituted, the more their reality and their truth increase. We shall see later on that the terms "institution" and "essence" are synonyms. On the relation between substance and institution, see Latour 1999b, chapter 5.

13. Let us recall again (see Chapter 2) that speech, in our argument, belongs from now on to assemblies of humans and nonhumans, and that the word *logos* describes the whole gamut from complete silence to complete speech, and the complex apparatus that gives voice to things and people alike.

14. The referendum organized by the Swiss in June 1998 is full of lessons from this standpoint. Since genetically modified organisms have to spread in fields, farmers became concerned parties in the discussion and claimed the right to add their grain of salt to the assured discourse of the lab coats. But the proliferation of voices in the course of the campaign (which was finally won by the industrials and the majority of researchers) was not limited to "classic" humans. Very quickly, as usual, the participants began to make nonhumans (genes, experimental fields, Petri dishes) speak differently; the lovely unanimity of these nonhumans found itself replaced by a lovely cacophony of experts subjected to the trial of a public discussion (Callon, Lascoumes, et al. 2001). In cacophony and kakosmos, the prefix is the same.

15. Another of Stengers' expressions, "reliable witness," should remind readers that humans are not necessarily involved and that it is not a matter of clearly expressing an opinion, either (Stengers 2000). As we shall see in the next chapter, the search for reliable witnesses is a risky enterprise, for which the overworked word "consultation"* does not seem to offer adequate preparation. By adding the notion of pertinence to the notion of consultation, we hope to alleviate its weakness, provided that the results of Chapter 2 on speech impedimenta are not forgotten. Democracy may be logocentric, but in the *logos* nonhumans speak too, or rather mumble. The *logos* encompasses not

only the stammerings of the orator Demosthenes but the complete gamut from silence to logorrhea.

16. The “bifurcation of nature,” to use Whitehead’s expression (Whitehead 1920), has become, if I dare say so, unconstitutional . . .

17. See especially the role of “whistle blowers,” as described by Chateauraynaud and Tornø (1999), and Sheila Jasanoff’s important book (Jasanoff 1995). For the difference between indoor and outdoor research, see Callon, Lascoumes, et al. 2001.

18. We recognize in the dislocation between the continuing movement of research and the work of closure, the emergence of the principle of precaution, so important for all these questions. See Godard 1997, Ewald 2001, Dratwa 2003, and Sadeleer 2002.

19. As we shall see in the following section and especially in Chapter 5, the only answer to this question is an experimental answer that can serve as a serious substitute for morality only after the introduction of the notion of collective experience*.

20. On the distinction between science and law, see Latour 2002d.

21. In all the following diagrams, I will use the metaphor of lower and upper house to designate these two assemblies that redissect the collective unified in the previous chapter. The metaphor is a bit far-fetched, I know, but I want to retain as many of the terms associated with our Western democratic tradition as possible.

22. Ulrich Beck has gone quite far in his exploration of the politics of risks with his invention of a new form of bicameralism. He clearly connects laboratory experience with that of the collective: “At this time there are two types of sciences that are in the process of diverging within the civilization of danger: the old laboratory science, still flourishing, that opens up the world through mathematics and technology but that has no experience, and a new form of political discursivity that, thanks to experience, makes the relation between ends and means, constraints and methods, visible in the form of controversies” (Beck 1997, 123). He sees the solution in the invention of two houses: “We must thus resort to two enclaves or forums, perhaps a sort of High Court or Technology Court that would guarantee the separation of powers between technical development and technical realization” (124). And his solution cannot be seen as anti-scientific any more than mine can: “Contrary to a widespread prejudice, doubt once again makes everything possible—science, knowledge, the critical spirit, and morality—but all this in a smaller size, more hesitant, more personal, more colorful, and more capable of learning, and by the same token also more curious, more open to contradictions, to incompatibilities, since that depends on the tolerance acquired thanks to the ultimate certainty that one will be mistaken in any event” (126).

23. This is a way of doing justice to Hermitte’s requirements in order to produce a “theory of decision making in a situation of uncertainty” (Hermitte 1996, 307) and to accept all the consequences of the principle of precaution.

24. A number of recent writings constitute a veritable anthropology of formalism that is profoundly modifying the theoretical description of theory work. See in particular Pickering 1995, MacKenzie 1996, Galison 1997, and Rosental 2000.

25. The contaminated blood scandal as well as the debates over the acceptance of genetically modified organisms make it possible to grasp the intermediate stages between local uncertainty and global certainty. On this notion of relative existence, see Latour 1999b, chapter 5.

26. The critique of expertise and its limits is capably analyzed in Jasanoff 1995, Lash,

Szerszynski, et al. 1996, and Irwin and Wynne 1996, and soundly deconstructed in Callon, Lascoumes, et al. 2001. All these studies stress the extent to which the old pedagogical conception of the relations between experts and the public is now outdated.

27. These ideas of transcendence and immanence all come, obviously, from the myth of the Cave and from a weakened conception of the social. They must nevertheless be taken seriously, as long as we have not restored to the collective its own proper form of immanence, which Plato mockingly but accurately calls *autophuos* in *Gorgias*. On this point, see Latour 1999b, chapters 7 and 8.

28. I have rarely given a lecture on science studies without having someone counter with the Lyssenko affair, followed three minutes later with the objection of the Nazis’ “Jewish science” (the order may change but the time lapse remains more or less stable). Those who might still have doubts about the morality of the bicameralism defined here may try to put it to the test with these two obligatory tortures of the epistemology police. The Lyssenko affair does not attest to an invasion of genetic science by political ideology, but, on the contrary, to an invasion of politics by Science, in the case in point the scientific laws of history and economics. With Red totalitarianism, the two short-circuits of Science and violence, Right and Might, reinforced one another to produce at one and the same time very poor politics—neither potato growers nor geneticists were consulted—and very poor science—the people involved managed neither to follow the influence of the genes nor to document the importance of the climate and modes of cultivation. How many seconds does it take to understand that the scientific ambitions of the Nazis did not respond to any of the requirements of perplexity, consultation, publicity, or closure? To suppress by violence all the slowing down of the procedure of the sciences and of politics in order to produce indisputable laws of history and race in the name of which they could kill *en masse* and with a clear conscience is not exactly the goal pursued by science studies . . .

29. I have been working stubbornly for twenty-five years to take advantage of this tiny problem: How is it that people can so easily accept a history of scientists but have so much difficulty granting a somewhat serious dose of historicity to the things these scientists have discovered? By separating the history of the sciences from ontology too quickly, people have prevented themselves from taking advantage of this very interesting anomaly.

30. Not to be confused, despite the cybernetic metaphor, with the numerous efforts by sociologists to short-circuit politics with a biologized or naturalized theory of the social world, as, for example, with Luhmann 1989. The vocabulary we are seeking remains properly political here, not biological.

31. This allows us to make clearer the difference encountered in Chapter 1 between modernist objects and nonmodern or risky objects*. Asbestos, which we took as our example, is characterized by the extreme slowness with which the excluded entities returned to compel reconsideration of the definition of this “perfect” insulating material: in France it took some thirty years for lung diseases to become an *integral part* of the definition of this inert material, this miracle product, for the presence of all those patients, upon their return to the finally perplexed collective, to require the demolition of thousands of square meters of offices and schools. A risky, civilized attachment would have taken less time to move from the outside to the inside (see Chapter 4, note 46): those the power to put in order had just excluded would have put the power to take

into account on alert right away. It is through this feature that I shall define civilization* later on, and it is that which will allow us to take full advantage of the principle of precaution (Ewald 2001).

32. We shall have to return to this crucial feature in detail in Chapter 5, when we approach the notion of collective experience* and the very particular type of normativity that will allow us to describe its course. I shall in fact use it to define a third power that could be called the *power to follow up**, which amounts to imagining—to use humble terms appropriate to industry—a sort of “quality control” on the “traceability” of the procedures.

4. Skills for the Collective

1. We see this in caricatural fashion in the discussion about subjective risks and objective risks, another place where the distinction between primary qualities* and secondary qualities* is made crudely; the former alone refers to reality, while the latter refers merely to psychic states, manipulation, or culture; see Rémy 1997. Once the division has been made, the question arises whether to take the eliminationist model (by means of force or by means of pedagogy) or the model of respectful hypocrisy (through confinement to the ghetto of culture or through discreet manipulation). On the other solutions, see the testimony collected in Lascoumes, Callon, et al. 1997.

2. See Acot 1998, and especially Drouin 1991 and Anker 2001.

3. For a history of the notion of ecosystem, see the meticulous study by Golley (1993). The term “ecumenical” has the same root as “ecology.” The familiar expression “everything that goes together” to form a whole must not be abused. Ecologists know how incredibly difficult it is to define partial totalizations, even locally. Politicians do too. See the excellent example offered in Western, Wright, et al. 1994, concerning the difficulty of determining what does or does not form a whole around the edges of natural parks when one puts humans and nonhumans together.

4. This is why, from the introduction on, I have refrained from distinguishing scientific ecology from political ecology. I have kept only the latter term, for it alone can highlight all the difficulty involved in composing a good common world. Moreover, speaking of “complexity” in no way guarantees that these political and procedural difficulties will be taken into account: one can short-circuit public life just as easily by oversimplifying as by “complexifying.” The famous “sciences of complexity” do not bring us any closer to the problem of composition than do the “sciences of the simple.”

5. A famous line by Tennyson that has become a proverb describing Darwinism:

Man . . .
 Who trusted God was love indeed
 And love Creation's final law—
 Tho' Nature, red in tooth and claw
 With ravine, shriek'd against his creed.

Tennyson, “In Memoriam AHH” (1850), Canto 56