

## **Morality and Technology : The End of the Means**

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# Morality and Technology

## The End of the Means

*Bruno Latour, translated by Couze Venn*

IT IS readily admitted that although human beings pose themselves moral problems concerning technologies (Should or should we not introduce in Europe genetically modified organisms? Must we dispose of the waste from the nuclear industry in deep or surface silos?) the objects in themselves do not have a moral dimension. Such is the current view of a large number of sociologists (Collins and Kusch, 1998). Technologies belong to the realm of means and morality to the realm of ends, even though, as Jacques Ellul declared a long time ago, some technologies end up invading the whole horizon of ends by setting up their own laws, by becoming 'autonomous' and no longer merely automatic. Even in this extreme case, it is maintained, there is no other resource for human beings than to disengage from this domination by technologies, a domination that is all the more perverse for not imposing the law of a master but that of an emancipated slave who does not have the least idea about the moral goals proper to humankind. We know about the advantage that Heideggerians have drawn from the idea of a technology that could not be tamed since it was itself pure mastery without a master (Zimmerman, 1990). To become moral and human once again, it seems we must always tear ourselves away from instrumentality, reaffirm the sovereignty of ends, rediscover Being; in short, we must bind back the hound of technology to its cage.

Yet it is not so certain that we can so easily allocate their places to means and ends, to the impulses of force and the relations of reason, to simple objects and the properly human dimension, to forgetfulness and the eruption of Being. I have tried for a long time to cast doubt on this distinction. A number of colleagues – sociologists, philosophers, moralists – have besides reproached me for having thereby confused the moral reason which human beings must have among themselves with the material and functional

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relations that technical objects exercise among themselves according to the imperative of a force. However, it is enough to briefly take account of the work by paleontologists and historians of antiquity to recognize that, according to them, the question of the emergence of technologies and that of humanity have been mixed up for about two and a half million years (Latour and Lemonnier, 1994). In the wake of pioneering work on chimpanzeean 'industry', we now begin to discover long periods in pre-history when technical ability preceded the emergence of human language by several hundred thousand years. It increasingly seems to be the case that human self-development appeared within a nest or a niche already inhabited by abilities, by know-how and technological objects (see for example Strum and Fedigan, 2000, as well as the work of Frédéric Joulain, 2000). If the tool is no more proper to humankind than laughter, it will become more and more difficult to trace the border between the empire of the human and the realm of technologies. In any case, the image of a human being at the helm manipulating inert objects to achieve ends through the intermediary of 'efficient action on matter' appears increasingly muddled. Technologies belong to the human world in a modality other than that of instrumentality, efficiency or materiality. A being that was artificially torn away from such a dwelling, from this technical cradle, could in no way be a moral being, since it would have ceased to be human – and, besides, it would for a long time have ceased to exist. Technologies and moralities happen to be indissolubly mingled because, in both cases, the question of the relation of ends and means is profoundly problematized. This is what I would like to demonstrate.

What can we do to give to technology the dignity equal to that of morality so that we may establish between them a relation which would no longer be that of the tool to the intention? First of all, by redefining the technical, which I will here consider to be an adjective and not a substantive. It is pointless to want to define some entities and some situations as technical in opposition to others called scientific or moral, political or economic. Technology is everywhere, since the term applies to a regime of enunciation, or, to put it another way, to a mode of existence, a particular form of exploring existence, a particular form of the exploration of being – in the midst of many others. If we are unable to distinguish between a technical object and a non-technical one, we should nevertheless be able to locate the dimension pertaining to technology in some entity. The regime of technology, if you wish, is different from another standpoint (scientific, artistic or moral) not in the way that a region of reality would differ from another, but in the way prepositions differ amongst themselves, in much the same way as 'in' is clearly distinguishable from 'by', although there is no particular domain of 'in' that we can separate from the territory 'by'. I would like to define the regime proper to technology by the notion of *fold*, without giving it all the Leibnizian connotations that Gilles Deleuze (1993) has elaborated so well.

What is folded in technical action? Time, space and the type of

actants. The hammer that I find on my workbench is not contemporary to my action today: it keeps folded heterogeneous temporalities, one of which has the antiquity of the planet, because of the mineral from which it has been moulded, while another has that of the age of the oak which provided the handle, while still another has the age of the 10 years since it came out of the German factory which produced it for the market. When I grab the handle, I insert my gesture in a 'garland of time' as Michel Serres (1995) has put it, which allows me to insert myself in a variety of temporalities or time differentials, which account for (or rather imply) the relative solidity which is often associated with technical action. What is true of time holds for space as well, for this humble hammer holds in place quite heterogeneous spaces that nothing, before the technical action, could gather together: the forests of the Ardennes, the mines of the Ruhr, the German factory, the tool van which offers discounts every Wednesday on Bourbonnais streets, and finally the workshop of a particularly clumsy Sunday bricoleur. Every technology resembles what surrealists called an 'exquisite cadaver'. If, for pedagogical reasons, we would reverse the movement of the film of which this hammer is but the end product, we would deploy an increasing assemblage of ancient times and dispersed spaces: the intensity, the dimension, the surprise of the connections, invisible today, which would thus have become visible, and, by contrast, would give us an exact measure of what this hammer accomplishes today. There is nothing less local, less contemporary, less brutal than a hammer, as soon as one begins to unfold what it sets in motion; there is nothing more local, more brutal and more durable than this same hammer as soon as one folds everything implicated in it.

But the mere distance of places and times is not sufficient to define the folding which is proper to technology: we still need to specify the connection itself. How would we preserve the irreversible trace of the fold? By means of a third disjunction, a third dislocation, by way of a new heterogeneity that will modify, this time not the diversity of times or that of the places, but that of the actors or actants. Without the hammer, I would have but my fist or some stone picked up outside my door to drive the nail in – and without the nail, I would be even more bereft. The very poverty in which I find myself when deprived of a hammer (let us recall the joy of Crusoe upon discovering the tools in the crates thrown up from the wreck) allows me to measure the beings in the place of which this hammer stands. To begin with, it replaces the long paradigmatic series that technologists have been keen to recreate, which redefine all the possible substitutes of that hammer throughout the course of history (Haudricourt, 1987). Instead of the places and times that we would need to deploy in order to do justice to that hammer, we should therefore add, if historians, historians of antiquity, palaeontologists, and primatologists would authorize it, the astonishing variety of forms which my mundane hammer has inherited. But it finds a place in another series, this time a syntagmatical one, since it provides for my fist a force, a direction and a disposition that a clumsy arm did not know it had.

It is impossible here to proceed as if the hammer 'fulfilled a function', for it overflows the strict limits of this container on all sides. The claim that 'the organ creates the function' can be made about all tools (and of the hammer in particular). With it in hand, the possibilities are endless, providing whoever holds it with schemes of action that do not precede the moment it is grasped. It is what James Gibson has so well documented with the notion of 'affordance', at once permission and promise: thanks to the hammer, I become literally another man, a man who has become 'other', since from that point in time I pass through alterity, the alteration of that folding (Gibson, 1986). This is why the theme of the tool as an 'extension of the organ' makes such little sense. Those who believe that tools are simple utensils have never held a hammer in their hand, have never allowed themselves to recognize the flux of possibilities that they are suddenly able to envisage. One can easily understand the anthropoid monkey in Stanley Kubrick's film *2001*, stupefied and surprised when faced with the world opened up by a jawbone held like a hammer – and as a club handy for killing. If, in a famous swirling movement, he flings it so high and far that it becomes the space station of the future, it is because all technologies incite around them that whirlwind of new worlds. Far from primarily fulfilling a purpose, they start by exploring heterogeneous universes that nothing, up to that point, could have foreseen and behind which trail new functions.

We readily understand how the notion of 'technical mediation' is rather inadequate to encompass this triple folding of places, times and agents. The term mediation always runs the risk that its message could be inverted and that one could turn whatever makes it impossible to transfer a meaning, a cause or a force into precisely what merely carries a force, a cause or a meaning. If we are not careful, we would reduce technologies to the role of instruments that 'merely' give a more durable shape to schemes, forms, and relations which are already present in another form and in other materials. To return to an example which has been very useful to me: traffic calming devices are not 'sleeping policemen' simply made of concrete instead of flesh and bone. If I consider calming devices as *mediators* properly speaking, it is precisely because they are not simple *intermediaries* which fulfil a function (Latour, 1996). What they exactly do, what they suggest, no one knows, and that is why their introduction in the countryside or in towns, initiated for the innocent sake of function, always ends up inaugurating a complicated history, overflowing with disputes, to the point of ending up either at the State Council or at the hospital. We never tame technologies, not because we lack sufficiently powerful masters, not because technologies, once they have become 'autonomous', function according to their own impulse, not because, as Heidegger claims, they are the forgetting of Being in the form of mastery, but because they are a true form of mediation. Far from ignoring being-as-being in favour of pure domination, of pure hailing, the mediation of technology experiments with what must be called *being-as-another*.

It is perhaps surprising that, in spite of technologies having nothing

to do with mastery, it is nevertheless always in the form of the instrument, of service rendered, that we speak about them. But is that really the case? It seems to me that it is more adequate to speak about technologies in the mode of the *detour* than in that of instrumentality. Technology is the art of the curve, or what, following Serres, I have called 'translation'. If we go in a straight line, as epistemology does, we do not need it, as we know from the time of the Greeks. Ingenuity begins with Daedalus, prince of the labyrinth, that is, with the unexpected branching-out which at first distances us from the goal (Frontisi-Ducroux, 1975). When we say there is a technical problem to resolve, we precisely wish to introduce the addressee to the detour, to the labyrinth that he will have to confront before pursuing his initial objectives. When we admire the technique of a specialist, we rightly recognize in it the passage that no one can master, except him, and specifically him, who besides does not know what he is doing (all the specialists in systems of expertise recognize this to their cost). How far we are from the function, from domination, from instrumentality! We find ourselves unexpectedly placed in front of what permits us (without understanding why) or what prevents us (without understanding that either) to have *direct* access to the goals.

Technologies never truly appear in the form of means, and that aspect becomes even more clear, I daresay, when one deals with them as black boxes of which we need only know the inputs and the outputs. The more technological systems proliferate, the more they become opaque, so much so that the growth of the rationality of the means and ends (according to the conventional model) is manifested precisely by the successive accumulation of layers, each of which makes the preceding ones more obscure (Latour, 1992a). In case we have forgotten about this fundamental opacity of technology, the quiet archaeological work conducted for the past decade and the frenzied work conducted in the past two years by information technologists in trying to rid us of the millennium bug remind us about it more clearly than all the philosophical attempts at elucidation. The very complexity of the apparatuses, which is due to the accumulation of folds and detours, layers and reversals, compilations and re-orderings, forever denies the clarity of right reason, under the aegis of which technologies have been first introduced.

Why then do certain dominant Western traditions in spite of everything speak of technology as something that is amenable to mastery? Why does that which should appear as unmasterable always in the end find itself regrouped in the realm of simple means? It is here where the conflict with moral mediation begins to appear. The modest appearance assumed by technology comes from *habit*, which prompts forgetfulness about all these interlinked mediations. The 'figure of the labyrinth', to recall Cornelius Castoriadis's nice expression, is known to every beginner and innovator: each discovers between himself and his aims a multitude of objects, sufferings, apprenticeships which force him to slow down, to take one detour after another, to lose sight of the initial aim, to return hesitatingly, to take courage,

etc. And yet, once the beginner becomes an expert by going through the apprenticeships one by one, once the invention has become an innovation as a result of the slow concretization which is demanded by industry and the market, we end up by being able to count on a unity of action which is so reliable that it becomes invisible. It is a characteristic of those technical mediators that they ultimately require invisibility (although in an entirely different way from scientific instruments). This is, of course, a kind of optical illusion. Indeed, the routine of habit must not prevent us from recognizing that the initial action, this famous 'plan' which is supposed to stand in for the programme materialized by the simple implementation of technology, has definitely mutated. If we fail to recognize how much the use of a technique, however simple, has displaced, translated, modified, or inflected the initial intention, it is simply because we have *changed the end in changing the means*, and because, through a slipping of the will, we have begun to wish something quite else from what we at first desired. If you want to keep your intentions straight, your plans inflexible, your programmes of action rigid, then do not pass through any form of technological life. The detour will translate, will betray, your most imperious desires.

By whatever end we take hold of technologies, the relations of means and ends will surely never appear as simple as is supposed by the archaic split between moralists in charge of the ends and technologists controlling the means. Like Saint Paul one should say of technologies: 'I do not do the good that I want, and commit the harm that I do not want' (Rom. 7–19).

In defining the hold of technology in terms of the notions of fold and detour, I think I have returned it to its ontological dignity. Without technologies, human beings would not be as they are, since they would be contemporaneous with their actions, limited solely to proximal interactions. Incapable of substituting anything whatsoever for absent entities that would stand in their place, they would remain without possible mediation, that is to say, without the ability to pass unexpectedly through the destiny of other completely heterogeneous beings, the possibilities of which are added to their own, thus inaugurating the progress of *multiple* histories, properly speaking. I have often, in a provocative spirit, toyed with the definition of social life purged of all foldings or technological detours as the shared dream of some sociologists, my colleagues, and of the monkeys of my friend Shirley Strum: a passionate, intense existence, which is constantly subject to the rapid renewal of coalitions and social relations properly so called, but which is nevertheless an existence that is barely human and hence hardly moral (Strum and Latour, 1987). Without technological detours, the properly human cannot exist. On a more serious note, we may detect it in innumerable works ranging from ergonomics to technology, passing through the remarkable efforts of Laurent Thévenot to classify modes of action (Thévenot, 1994; Thévenot and Livet, 1997). Technologies bombard human beings with a ceaseless offer of previously unheard-of positions – engagements, suggestions, allowances, interdictions, habits, positions, alienations, prescriptions, calculations, memories. Generalizing the notion of

affordance, we could say that the quasi-subjects which we all are become such thanks to the quasi-objects which populate our universe with minor ghostly beings similar to us and whose programmes of action we may or may not adopt. If the robe does not make the monk, wearing a frock makes us slightly more pious.

We always hesitate before recognizing in this bombardment of possible positions one of the essential resources of humanity, since there exist many other sources with which we would not wish to confuse them. Obviously, a person is not constituted solely in the act of grasping a tool, or when the rhythm of the conveyor belt is imposed upon him, upon receiving the offer of a bridging loan from an automatic machine at the bank, or when he absent-mindedly slips into the habitual course of activity of a well-equipped kitchen, or when he is given an artificial memory through the disposition of goods in a supermarket. To have a personality, one must benefit from a good many other regimes of existence, many other connections (Ricoeur, 1990; Latour, 1998). Yet the existence of a multiplicity of modes of exploration of being does not justify turning technical enunciation into a simple material domain on the surface of which always float symbols, values, judgements and tastes, since that habit would cause all mediations to gradually disappear. The error is all the more serious to the extent that the body itself can grasp itself in the modality of technique and from that point begins to proliferate in detours and foldings (Dagognet, 1993). Every artist, every technician or artisan, every surgeon knows that technicity is never simply a question of a new way of distributing bodies, some being artificial and others natural, the vascularization of which alone allows the feats which we attribute afterwards, through laziness, either to objects or to human genius (Akrich and Berg, forthcoming). In this sense, all techniques are, in Marcel Mauss's terms, techniques of the body.

What in this definition is it, we may ask, which is so remote from the current usage of the substantive 'technology' yet so close to the adjective 'technical', that brings us close to the moral question? At first I thought we would take a giant step forward if only we would recognize that a substantial part of our everyday morality rested upon technological apparatuses. It is what I called the 'missing mass of morality' (Latour, 1992b). One example will suffice, for the reader will readily find 20 other more relevant ones. For reasons unknown to me, the maker of my desk prevents me from opening a drawer without the two others being carefully and completely shut. The designer has disappeared; besides, the firm (with some justice) went bankrupt ages ago; I am not a good enough bricoleur to discover the counterprogramme which would put an end to this aberration; nevertheless 20 times a day for 10 years, I am 'obliged' to obey this meddlesome moral law since I am not 'authorized' to leave the three drawers open at the same time. I rail against it but I get on with it, and I have no shame in admitting that every day there is no other moral law that I apply with such inflexible severity. Blast it, it is because I am bound by it! Of course, the moral law is in our hearts, but it is also in our apparatuses. To the *super-ego* of tradition



we may well add the *under-ego* of technologies in order to account for the correctness, the trustworthiness, the continuity of our actions.

If there is something to be gained by subtracting the part pertaining to technical objects from the sum of moral behaviour, this however only touches the surface of the problem, since we are considering techniques and moral action only at the level of their routinized or habitual or slight maladjustment stage. As Louis Quéré (pcrs.com) has rightly pointed out, we cannot infer from the current usage of terms of duty and authorization that technical objects have an obvious moral dignity *in themselves*. Therefore, that has not exactly been my intention. It is mainly the contempt that sociologists have for matter and for technological innovation which has led me previously to exaggerate somewhat in speaking about the 'tragic dilemmas of a safety belt'. Nevertheless, we may recognize that I was not completely mistaken by now granting to morality the same ontological dignity given to technology as I have just redefined it above.

Morality, of course, like science or technology, is an heterogeneous institution constituted from a multiplicity of events, which depends at the same time on all modes of existence – and in part, as I have just said, on the arrangement of technical apparatuses, but equally on a good many other forms of organization, a veritable hotbed of confusion, as one can verify by reading dictionaries of moral philosophy. I believe, however, that it is possible to give it its proper definition, by way of its specific way of exploring the alterity of being. Morality too is a mode of existence, a standpoint on being-as-another, a predisposition, an original regime of mediation. The form in which one usually recognizes it, obligation, does not properly belong to it since the latter derives just as much from contract, from religious events, from transfers (*frayeurs*), from chains of references, from the law, in short, from a whole composite series that it would be futile to unravel for now. The only thing that interests me here is the point of friction between the standpoint of technology and the standpoint of morality regarding the relation between means and ends. It is clear enough from their competing, contradictory definition of alterity that there is between the two neither a pre-established harmony nor an order that accords with the relations of means and ends. They both mould being-as-another but each in a different way. Morality is no more human than technology, in the sense that it would originate from an already constituted human who would be master of itself as well as of the universe. Let us say that it *traverses the world* and, like technology, that it engenders in its wake forms of humanity, choices of subjectivity, modes of objectification, various types of attachment. It is to the qualification of this trajectory that we must now attend.

The folding, the technological detour, as I have said, mingles beings into an heterogeneous existence and inaugurates an unexpected history by the multiplications of *aliens* which henceforth intervene between two sequences of action, suddenly creating in our path a labyrinth from which we can never escape, or alternatively, a routine of such familiarity that, just like Zeno's hare, we would never realise that we had just escaped from a

giddy infinity. Between the gesture of switching on my computer and what I write on the screen, I can either ignore the nuclear industry which enables me to work this morning, or find myself immersed in the uncertain destiny of that same industry which forces me to take account of the burial in deep silos of the waste from its stations that the French do not support. Such is the impressive scope of the concertina movement that characterizes technology: either I have the most secure, the most silent access to a course of action (to the extent that I no longer include in my description the nuclear industry reduced to the rank, not of means, but of *nothing*), or else I find myself in the maze which the whole of France blindly traverses shouting: 'but how can we get rid of it?!' A few seconds ago, I was in possession of resources that were so standard that they accounted for nothing; now, I find myself in ends so final that no one knows any longer how the common history will end.

Let us not conclude from this concertina or fan movement switching violently from zero to infinity that, in the former case, we are dealing with a 'simple technical question' whilst, in the latter case, we have posed a moral question 'dealing with' an industry. No, it is in the very essence of this technical apparatus that rests the complete uncertainty about the relations of means and ends. It is intrinsic to the rhythm pertaining to technology to alternate violently from modesty to terror, from the tool to the horizon, from surprise to routine. There is nothing surprising about that, since with the enfolding of the nuclear industry, we have tied the fate of our computers to radioactivity, gradually binding the slow history of my career to the millisecond rhythm of informational fleas, and the whole series to the fate of wastes, the half-life (or half-death) of which can be calculated, for some, in hundreds of years. This 'time garland' has a real existence in my vision and opens onto a history that has *no end*. The paradox of technology is that it is always praised for its functional utility, or always held in contempt because of its irritating neutrality, although it has never ceased to introduce a history of enfoldings, detours, drifts, openings and translations that abolish the idea of function as much as that of neutrality. How dare we qualify as neutral the ontological drama of unexpected assemblages of entities which can pass, without a hitch, from zero to infinity? It is not for nothing that Vulcan limped . . . Behind the tired repetition of the theme of the neutrality of 'technologies-that-are-neither-good-nor-bad-but-will-be-what-man-makes-of-them', or the theme, identical in its foundation, of 'technology-that-becomes-crazy-because-it-has-become-autonomous-and-no-longer-has-any-other-end-except-its-goalless-development', hides the fear of discovering this reality so new to modern man who has acquired the habit to dominate: there are *no masters anymore* – not even crazed technologies.

It is with a quite different feel for alterity that morality explores the same assemblages of beings whose fate has become mingled by the detour of technology (and by a good many other forms of existence whose difference does not interest us here). Every technological initiation pays for the multiplication of mediators in the creation of intermediaries. The growth of

the oak from the Ardennes was directed to quite other ends than the production of my hammer, even if it had been planted with this end vaguely in mind. Of the oak, the tool has kept but a minute part of its properties of solidity, of warmth, of the alignment of the lines of lignite. Where was the oak going by itself and for itself? In what world did it prolong its existence? Technology is not interested in such a question, compelled as it is to dislodge all the entities through which it passes in order to engender possible worlds and allow new dispositions. A very different anxiety runs through morality: how many mediators do the other forms of existence maintain in their wake? Do we not run the risk of treating the oak as a simple means for the hammer? Everyone knows the simplified version that human morality, all too human, has given to this principle: 'do not ever treat human beings simply as means, but always as ends as well'. Kant, of course, applied it to human beings alone, and not to the hammer, to oaks or to radioactive uranium atoms. Having reactivated the fable of homo faber, he really imagined human beings in command, putting its categories to work on a raw material without rights. Two hundred years later, such a position appears to us equally indefensible as the accounts of the elephant hunts of Theodore Roosevelt or the quibbles of the Greeks regarding the impossibility of freeing slaves who were considered inferior by nature. It is because morality since that time has reworked the common material blended by technologies that have bound together more and more entities in the same common fate (Latour, 1999a).

We can no longer pose the question of morality in the same way as we would have done at a time when human beings had hardly started to scratch the earth on which they passed from life to death without anyone *else* noticing. Morality and technology are ontological categories, as Gilbert Simondon following Etienne Souriau (Souriau, 1943) has so well expressed it, and the human comes out of these modes, it is not at their origin. Or rather, it cannot become human except on condition of opening itself to these ways of being which overflow it from all sides and to which it may choose to be attached – but then at the risk of losing its soul. Morality, if we agree to detach it for a moment from the complex institution which has shaped it in a thousand ways, appears thus a concern which ceaselessly works upon being-as-another to prevent ends from becoming means, mediators from being transformed into simple intermediaries. It does not so much interrogate itself about the right of things for themselves (even though deep ecology has shaped the ethical question in such a way as to throw morality outside a narrow anthropocentrism), but about the existence of things and the meaning of this expression 'for themselves'. Nothing, not even the human, is for itself or by itself, but always *by other things* and *for other things*. This is the very meaning of the exploration of being-as-another, as alteration, alterity, alienation. Morality is concerned with the *quality* of this exploration, with the number of mediators that it leaves in its wake, always wanting to verify if it proliferates the greatest possible number of actants that claim to exist and intervene in their own name or whether, on the

contrary, it has not resigned itself to forgetting them. Wherever we want to go fast by establishing tracks so that a goal can race along them whistling like a high-speed train, morality dislocates the tracks and recalls to existence all the lost sidings. The goal-oriented train soon comes to a stop, burdened, powerless. As it is often said, morality is less preoccupied with values than with preventing too ready an access to ends.

Let us not limit such a slowing down to human beings alone. To go back to the case of nuclear waste, no one would any longer imagine imposing on the mayors of small villages, the implantation, without any discussion, of a laboratory in order to study the resistance of granite, salt, or clay. Fifty years ago, we could treat populations as straightforward means to the national interest: not any more. We must now approach them politely, and we may read Yannick Barthe's thesis for the excess of patience that ANDRA must deploy to keep them in their place or to seduce them (Barthe, 2000). But how do we qualify the other actants that the history of technology has mingled in a common fate with human villages, for better or for worse, by means of a marriage that one no longer dare call 'of reason'? Can the glass of the containers hold for several thousand years? What trust may we have in the geology of tectonic plates, the history of which is hardly 100 years old and the detailed observation of which is but 20 years old? What do we know about the salt domes? Hence the new question of human and material morality: which is the more durable in the very long term? The malleable clay, the hard salt, the fallible granite, or instead the fragile but ceaselessly renewed link among human organizations, able to oversee, for countless centuries, the surface of a pool 'monitored' by beings as far into the future as the Neanderthals are into the past?

Once we have grasped morality as well as technology in its ontological dignity instead of relating them, as usual, solely to what is human, we may see that their relation is not at all that of means to end, practical spirit to spirit *tout court*, facts to values, or symbolic obligation to the stubborn obduracy of things. The two modes of existence ceaselessly dislocate the dispositions of things, multiply anxieties, incite a profusion of agents, forbid the straight path, trace a labyrinth – generating possibilities for the one, and scruples and impossibilities for the other. The worry about values does not disappear once the question of the safety of salt domes and glasses has been resolved. Even in the depth of caves, it comes to trouble the engineer by increasing the beings that he had perhaps too quickly treated as intermediaries (regular networks of rock crystals, the alignment of silicas) to make them reappear in front of his eyes in the shape of just as many mediators that are difficult to scorn, to tame: lunules, defects, breaks, microscopic errors, the multiplication of which, on the scale of eons, widens the fault in the reasoning of politicians and casts doubt upon the weak and stubborn opinion of 'the working classes' – at least superficially. Morality comes to rework precisely *the same materials* as does technology, but by extracting from each of them *another form of alterity* because its primary concern is the impossibility of their fitting into the mould of intermediaries. Well before

we are able to translate the moral exigencies of tradition into obligations, they already lie inside that massive objectivity of mediations that forbid them being taken for ends for whoever and whatever else. In this sense, morality is from the beginning inscribed *in the things* which, thanks to it, *oblige us to oblige them*.

If technology causes dislocations, it is in order to readjust; if it opens up in front of an aim the abyss of means enframed within each other in a maze of new inventions, it is in order to close this abyss again and to create, through either the automatism of skill or the automatism of automatons, an invisible course of action which no longer even counts; if it introduces us to an unexpected history, it is to ensure that the initial goal, displaced, renewed, ends up coinciding closely with the new means that have just emerged, to the point that we begin to speak about the adequacy of form to function as we would of the glove to the hand. Nothing of that sort happens with morality: there is no question of a black box here, or the disappearance of millions of partial goals framed within the one means that would no longer matter and would disappear from sight. The work of mediation, in its moral organization, requires instead the ceaseless circuit of concern, the penetrating return of scruple, the anxious reopening of the tombs in which automatisms have been heaped, the redeployment of means into partial aims and aims into partial ends.

The precautionary principle, so much in fashion, does not simply mean that we stop taking action until we are certain about the innocuousness of a good, for that would once again return us to the ideal of mastery and knowledge by demanding certain knowledge about an innovation which, by definition and like any technology, *forever* escapes mastery. On the contrary, the principle of precaution resides in the permanent maintenance of the impossibility of folding – which is precisely what technology aspires to: whence the permanent conflict of ways of being. To maintain the reversibility of foldings: that is the current form that moral concern takes in its encounter with technology. We find it everywhere now in the notion of a recyclable product, of sustainable development, of the traceability of the operations of production, in the ever stronger concern for transparency (to look for transparency in matters of technology, what a paradox!), in the fairly new demand in France for accountability, that is to say, for describability and for the evaluation of options. It is in this new sense that morality finds itself in permanent and continuous conflict with the openness to history that technology constantly suggests (Latour, 1999b: ch. 4).

As one can see, the relation of technology to morality is somewhat modified as soon as we renounce the idea of putting the first on the side of means and the second on the side of ends. Each of these modes of existence upsets in its own distinctive way the relations between means and ends: technology by dislocating the relations between entities in such a way that they open towards a series of new linkages that force the constant displacement of goals and multiply intermediary agents whose collective sliding forbids any mastery; morality, by constantly interrogating aggregates

to make them express their own aims and prevent a too hasty agreement about the definitive distribution of those that will serve as means and those that will serve as ends. If one adds morality to technology, one is bound to notice, to make a pun, *the end of the means*. Without means, another history begins, since morality and technology multiply the entities we must consider and must learn to reassemble. This gathering, this progressive composition of a common world, obliges us to return to another form of enunciation, this time a political one, which similarly aspires to recover its ontological dignity in order to escape from the state of abasement in which it had been cast by a scorn that has lasted even longer than that which technology has had to endure for so long.

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