

sequence. However, the development of social integration is by no means synonymous with a sequential decrease in social exploitation.

From an evolutionary perspective, the type of social integration that is tied to the kinship system and that, in conflict situations, is maintained through preconventional legal sanctions belongs to a lower stage of development than the type that involves political rule and that, in conflict situations, is maintained through conventional legal practices. Yet, from the vantage-point of moral standards applicable to both primitive and civilized societies, the form of exploitation necessarily practised in class societies must be judged as a regression in comparison with the moderate social inequalities possible in kinship systems. This explains why class societies are structurally unable to satisfy the need for legitimation that they produce. This is the key to the recurring class struggles in postkinship societies.

Note

- 1 Compare Klaus Eder, *Zur Entstehung staatlich organisierter Gesellschaften* (Frankfurt-Main: Suhrkamp, 1976).

10 Unscrewing the big Leviathan: how actors macro-structure reality and how sociologists help them to do so

*Michel Callon and Bruno Latour**

Canst thou fill his skin with barbed irons? . . . Lay thine hand upon him remember the battle, do no more . . . None is so fierce that dare stir him up: who then is able to stand before me?

Job 41:7,8,10

[Like Habermas, Callon and Latour conceive of micro-macro relations in dynamic terms, but they do not conceive of them in evolutionary terms. The process they have in mind is not a process in which forms of social integration become replaced by new forms on the basis of social learning, but rather a process by which micro-actors successfully grow to macro-size.

Callon and Latour consider the macro-order to consist of macro-actors who have successfully 'translated' other actors' wills into a single will for which they speak. This enrolment of other actors allows them to act like a single will which is, however, extremely powerful because of the forces on which it can rely. How do micro-actors grow to such formidable sizes like that of big multinational corporations? Callon and Latour say that unlike baboons, human actors are able to rely not only on symbolic relations, but also on more 'durable' materials, for which they provide examples. It is this difference which allows the human society to produce macro-actors and which forces the baboon society to enact all its relations on a micro-level of symbolic practice.

The present chapter is the contribution to the book which most forcefully reminds us of a possible correlation between power and the macro-level. It is also the chapter whose conception of macro-actors is perhaps most similar to Har  's notion of structured collectivities to which he attributes causal powers (see chapter

* Authors in alphabetical order. We especially thank John Law, Shirley Strum, Karin Knorr, Lucien Karpik and Luc Boltanski for their sharp criticism which we failed, most of the time, to answer.

4), and which has some overlap with Cicourel's focus on the summarizing procedures through which the macro is generated within micro-social action (see chapter 1 and section 5 of the Introduction). In a sense it can be seen as the macro-counterpart of the last mentioned micro-conceptions.]

1 Hobbes's paradox

Given: a multitude of equal, egoistic men living without any law in a merciless state of nature that has been described as, 'the war of every one against every one'.¹ How can this state be brought to an end? Everyone knows Hobbes's reply: through a contract that every man makes with every other and which gives one man, or a group of men bound to none other, the right to speak on behalf of all. They become: the 'actor' of which the multitude linked by contracts are the 'authors'.² Thus 'authorized',³ the sovereign becomes the *person* who says what the others are, what they want and what they are worth, accountant of all debts, guarantor of all laws, recorder of property registers, supreme measurer of ranks, opinions, judgments and currency. In short the sovereign becomes the Leviathan: 'that Mortal God, to which we owe under the Immortal God, our peace and defense'.⁴

The solution proposed by Hobbes is of interest to political philosophy and of major importance to sociology, formulating clearly as it does for the first time the relationship between micro-actors and macro-actors. Hobbes sees no difference of level or size between the micro-actors and the Leviathan *which is not the result of a transaction*. The multitude, says Hobbes, is at the same time the Form and the Matter of the body politic. The construction of this artificial body is calculated in such a way that the absolute sovereign is nothing other than the sum of the multitude's wishes. Though the expression 'Leviathan' is usually considered synonymous with 'totalitarian monster', in Hobbes the sovereign says nothing on his own authority. He says nothing without having been authorized by the multitude, whose spokesman, mask-bearer and amplifier he is.⁵ The sovereign is not *above* the people, either by nature or by function, nor is he higher, or greater, or of different substance. He is the people itself in another state – as we speak of a gaseous or a solid state.

This point seems to us of capital importance, and in this paper we

should like to examine all its consequences. Hobbes states that there is no difference between the actors which is *inherent in their nature*. All differences in level, size and scope are the result of a battle or a negotiation. We cannot distinguish between macro-actors (institutions, organizations, social classes, parties, states) and micro-actors (individuals, groups, families) on the basis of their dimensions, since they are all, we might say, the 'same size', or rather since size is what is primarily at stake in their struggles it is also, therefore, their most important result. For Hobbes – and for us too – it is not a question of classifying macro- and micro-actors, or reconciling what we know of the former and what we know of the latter, but posing anew the old question: how does a micro-actor become a macro-actor? How can men act 'like one man'?

The originality of the problem posed by Hobbes is partly concealed by his solution – the social contract – which history, anthropology and now ethology have proved impossible. The contract, however, is merely a specific instance of a more general phenomenon, that of translation.⁶ By translation we understand all the negotiations, intrigues, calculations, acts of persuasion and violence,⁷ thanks to which an actor or force takes, or causes to be conferred on itself, authority to speak or act on behalf of another actor or force:⁸ 'Our interests are the same', 'do what I want', 'you cannot succeed without going through me'. Whenever an actor speaks of 'us', s/he is translating other actors into a single will, of which s/he becomes spirit and spokesman. S/he begins to act for several, no longer for one alone. S/he becomes stronger. S/he grows. The social contract displays in legal terms, at society's very beginnings, in a once-and-for-all, all-or-nothing ceremony, what processes of translation display in an empirical and a reversible way, in multiple, detailed, everyday negotiations. The contract need only be replaced by processes of translation and the Leviathan will begin to grow, thus restoring to Hobbes's solution all its originality.

The aim of this article is to show what sociology becomes if we maintain Hobbes's central hypothesis – provided we replace the contract by a general law of translation. How can we describe society, if our aim is the analysis of the construction of differences in size between micro- and macro-actors?

The methodological constraints we impose for describing the Leviathan should not be misunderstood. We should miss the point

completely, if we distinguish between 'individuals' and 'institutions'; if we supposed that the first fell within the sphere of psychology, and the second of economic history.⁹ *There are* of course macro-actors and micro-actors, but the difference between them is brought about by power relations and the constructions of networks that will *elude analysis* if we presume *a priori* that macro-actors are bigger than or superior to micro-actors. These power relations and translation processes reappear more clearly if we follow Hobbes in his strange assumption that all actors are isomorphic.¹⁰ Isomorphic does not mean that all actors have the *same* size but that *a priori* there is no way to decide the size since it is the consequence of a long struggle. The best way to understand this is to consider actors as networks. Two networks may have the same shape although one is almost limited to a point and the other extends all over the country, exactly like the sovereign can be one among the others and the personification of all the others. The financier's office is no larger than the cobbler's shop; neither is his brain, his culture, his network of friends nor his world. The latter is 'merely' a man; the former is, as we say, a 'great man'.

Too often sociologists – just like politicians or the man in the street – *change their framework of analysis* depending on whether they are tackling a macro-actor or a micro-actor, the Leviathan or a social interaction, the culture or individual roles. By changing the framework of analysis while this is under way they confirm the power relations, giving aid to the winner and giving the losers the 'vae victis'.

This problem has become urgent – as the contributors to this volume suggest – because no sociologists at present examine macro-actors and micro-actors using the same tools and the same arguments. They take it for granted that there are differences in level between micro-sociological analysis and macro-sociological analysis, though they may still want to reconcile them in a broad synthesis.¹¹

It seems to us that sociologists are too often on the wrong foot. Either, believing that macro-actors really do exist, they anticipate the actors' strength by helping them to grow more vigorous.¹² Or else they deny their existence, once they really do exist, and will not even allow us the right to study them.¹³ These two alternate but symmetrical errors stem from the same presupposition: the acceptance as a given fact that actors can be of different or of equal size. As soon as we reject this presupposition, we are once again faced with Hobbes's paradox: no actor is bigger than another except by means of

a transaction (a translation) which must be examined. We show in this article that if one remains faithful to Hobbes's paradox, one avoids the symmetrical errors and understands how the Leviathan grows.

In section 2 we attempt to resolve the following paradox: if all actors are isomorphic and none is by nature bigger or smaller than any other, how is it that they eventually end up as macro-actors or individuals? In section 3 we shall examine how actors wax and wane, and how the methods we propose enable us to follow them through their variations in size, without having to alter the framework for analysis. Lastly, in the conclusion, we consider in more detail the role of sociologists in such variations in relative size.

2 Baboons, or the impossible Leviathan

Let us leave Hobbes's myth of the Leviathan and take another myth: the impossible Monkey-Leviathan or the difficulty of building up macro-actors in a herd of baboons living in the wild.¹⁴ Hobbes believed that society only emerged with man.¹⁵ This was believed for a long time, until gatherings of animals were observed closely enough for it to become clear that theories about the emergence of societies were pertinent for primates, ants, the Canidae, as well as for men.

This 'disordered' herd of brute beasts – eating, mating, howling, playing and fighting one another in a chaos of hair and fangs – surely tallies closely with the 'state of nature' postulated by Hobbes. Without any doubt at all the life of a baboon is 'poor, nasty, brutish and short'.¹⁶ This image of total disorder enabled a contrast to be made, right from the beginning, between human society and bestiality, between social order and chaos. At least this is how animals were imagined before people actually went and studied them.

When, before the Second World War, but more intensively since the 1950s, people began to study baboons, each observer reconstructed Hobbes's Leviathan on his own account.¹⁷ The baboons no longer live in disordered bands. They started living in rigid cohorts where the females and their young are surrounded by dominant males organized according to a strict hierarchy. In the 1970s, the image of a pyramid-shaped society of monkeys has gradually come to be used as a foil for human societies which have been said to be more flexible,

freer and more complex. Over 30 years, the study of primates has thus been used as a projective test: first, bestial chaos was observed, then a rigid, almost totalitarian system. Baboons have been obliged to re-structure the Leviathan and to move from the war of all against all to absolute obedience.

Despite this, observers closer to the monkeys have gradually worked out a different Leviathan. The baboons do indeed have organization: not everything is equally possible in it. One animal does not go close to just any other; an animal does not cover or groom another by chance; nor does it move aside just at random; animals cannot go just where they wish. However, this organization is never rigid enough to constitute an integrated system. As the observers have come to know their baboons better, the hierarchies of dominance have become more flexible, finally dissolving – at least in the case of the males.¹⁸ Primary aggressiveness has become rarer: it has been seen to be consistently channelled and socialized until finally the groups of baboons have become surprisingly 'civil'. The famous elementary impulses which fuel the war of all against all – eating, copulating, domination, reproduction – have been observed to be constantly suspended, halted and diffracted by the play of social interactions. There is no chaos, but no rigid system either. Now the baboons live in units, none of which is rigid, but none of which is flexible. In addition to differences of size, sex and age, social links, are the family, clan and friendship networks, or even habits due to traditions and customs. None of these categories is clearly defined since they all come into play together, and can break apart again. Observers now construct the baboon society as one whose texture is much stronger than was imagined by those who thought it a chaos of brute beasts, but infinitely more flexible than postwar observers thought.

For a society of baboons to be at the same time so flexible and yet so close-knit, an amazing hypothesis had to be advanced: more and more extensive social skills had to be bestowed on the monkeys in order to make them competent to repair, accomplish and ceaselessly consolidate the fabric of such a complex society.¹⁹

A baboon's life is not easy in the new society that has been forged for it and is no less difficult than our life as revealed by ethnomethodological works. He must constantly determine who is who, who is superior and who inferior, who leads the group and who follows, and who must stand back to let him pass. And all he has to help him are

fuzzy sets whose logic is fashioned to evaluate hundreds of elements. Each time it is necessary, as the ethnomethodologists say, to repair indexicality. Who is calling? What is it intending to say? No marks, no costumes, no discreet signs. Of course, many signs, growls and hints exist, but none of them is unambiguous enough. Only the context will tell, but simplifying and evaluating the context is a constant headache. Hence the strange impression these animals give today. Living as they do in the heart of the bush, all they should be thinking about is eating and mating. But all they care about is to stabilize their relations, or, as Hobbes would say, durably to attach bodies with bodies. As much as we do they build up a society which is their surroundings, shelter, task, luxury, game and destiny.

To simplify we might say that baboons are 'social animals'. The word 'social' derives, we know, from 'socius', which is akin to 'sequi', to follow. First of all to follow, then to form an alliance or to enlist, then to have something in common, to share. Several act like a single entity, the social link is there. Baboons are social like all social animals in the sense that they follow each other, enrol each other, form alliances, share certain links and territories. But they are social, too, in that they can maintain and fortify their alliances, links and partitions only with the tools and procedures that ethnomethodologists grant us to repair indexicality. They are constantly stabilizing the links between bodies by acting on other bodies.²⁰

Only among the baboons are the living bodies alone, as Hobbes requires, at the same time the Form and the Matter of the Leviathan. But what happens when this is the case? There is no Leviathan. We must now formulate the central question: if the baboons realize Hobbes's conditions and offer us the spectacle of a society made with no solid Leviathan or durable macro-actor, how are the solid, durable macro-actors which we see forming everywhere in human societies, actually constructed?

Hobbes thought the Leviathan could be built with bodies, but then he was only talking about baboons. His Leviathan could never have been built if bodies had been the Form *and* Matter of the social body. Although in order to stabilize society everyone – monkeys as well as men – need to bring into play associations *that last longer than the interactions that formed them*, the strategies and resources may vary between societies of baboons or of men. For instance, instead of acting straight upon the bodies of colleagues, parents and friends, like

baboons, one might turn to more solid and less variable materials in order to act in a more durable way upon the bodies of our colleagues, parents and friends. In the state of nature, no one is strong enough to hold out against every coalition.²¹ But if you transform the state of nature, replacing unsettled alliances as much as you can with walls and written contracts, the ranks with uniforms and tattoos and reversible friendships with names and signs, then you will obtain a Leviathan: 'His scales are his pride, shut up together as with a close seal. One is so near to another that no air can come between them. They are joined one to another; they stick together that they cannot be sundered' (Job 41:15–17).

A difference in relative size is obtained when a micro-actor can, in addition to enlisting bodies, also enlist the greatest number of durable materials. He or she thus creates greatness and longevity making the others small and provisional in comparison. The secret of the difference between micro-actors and macro-actors lies precisely in what analysis often neglects to consider. The primatologists omit to say that, to stabilize their world, the baboons do not have at their disposal any of the human instruments manipulated by the observer. Hobbes omits to say that no promise, however solemn, could frighten the contracting parties enough to force them to obey. He omits to say that what makes the sovereign formidable and the contract solemn are the palace from which he speaks, the well-equipped armies that surround him, the scribes and the recording equipment that serve him.²² The ethnomethodologists forget to include in their analyses the fact that ambiguity of context in human societies is partially removed by a whole gamut of tools, regulations, walls and objects of which they analyse only a part. We must now gather up what their analysis leaves out and examine with the same method the strategies which enlist bodies, materials, discourses, techniques, feelings, laws, organizations. Instead of dividing the subject with the social/technical, or with the human/animal, or with the micro/macro dichotomies, we will only retain for the analysis *gradients of resistivity* and consider only the *variations in relative solidity and durability of different sorts of materials*.

By associating materials of different durability, a set of practices is placed in a hierarchy in such a way that some become stable and need no longer be considered. Only thus can one 'grow'. In order to build the Leviathan it is necessary to enrol a *little more* than relationships, alliances and friendships. An actor grows with the number of rela-

tions he or she can put, as we say, in black boxes. A black box contains that which no longer needs to be reconsidered, those things whose contents have become a matter of indifference. The more elements one can place in black boxes – modes of thoughts, habits, forces and objects – the broader the construction one can raise. Of course, black boxes never remain fully closed or properly fastened – as it is particularly the case among the baboons – but macro-actors can do *as if* they were closed and dark. Although, as ethnomethodologists have shown, we are all constantly struggling for closing leaky black boxes, macro-actors, to say the least, do not have to negotiate with *equal intensity* everything. They can go on and count on a force while negotiating for another. If they were not successful at that, they could not simplify the social world. In mechanical terms, they could not make a machine, that is hide the continued exercise of a will to give the impression of forces that move by themselves. In logical terms, they could not make chains of arguments, that is stabilize discussion of certain premises to allow deductions or establish order between different elements.

If the expression 'black box' is too rigid to describe the forces which shut off the stacks of boxes, and keep them hermetically sealed and obscure, another metaphor is possible, one Hobbes might have used had he read Waddington.²³ In the first moments of fertilization, all cells are alike. But soon an epigenetic landscape takes form where courses are cut out which tend to be irreversible; these are called 'chreods'. Then cellular differentiation begins. Whether we speak of black boxes or chreods, we are dealing with the creation of asymmetries. Let us then imagine a body where differentiation is never fully irreversible, where each cell attempts to compel the others to become irreversibly specialized, and where many organs are permanently claiming to be the head of the programme. If we imagine such a *monster* we shall have a fairly clear idea of the Leviathan's body, which we can at any moment see growing before our very eyes.

The paradox with which we ended the introduction has now been resolved. We end up with actors of different size even though they are all isomorphic, because some have been able to put into black boxes more elements durably to alter their relative size. The question of method is also resolved. How can we examine macro-actors and micro-actors, we were wondering, without confirming differences in size? Reply: by directing our attention not to the social but towards

the processes by which an actor creates lasting asymmetries. That among these processes some lead to associations which are sometimes called 'social' (associations of bodies), and that some of the others are sometimes called 'technical' (associations of materials), need *not* concern us further. Only the differences between what can be put in black boxes and what remain open for future negotiations are now relevant for us.

To summarize, macro-actors are micro-actors seated on top of many (leaky) black boxes. They are neither larger, nor more complex than micro-actors; on the contrary, they are of the same size and, as we shall see, they are in fact simpler than micro-actors. We are able, now, to consider how the Leviathan is structured, since we know that we do not need to be impressed by the relative size of the masters, or to be frightened by the darkness of the black boxes.

3 Essay in teratology

In this section, we leave Hobbes's barbarous, juridical Leviathan, as well as the 'bush and savannah' Leviathan we saw in action among the baboons. We shall follow up one detail of the huge, mythical monster in a modern context: the way in which two actors – Electricity of France (EDF) and Renault – varied their relative dimensions in the course of a struggle that took place between them during the 1970s.²⁴

To replace the usual divisions (macro/micro; human/animal; social/technical), which we have shown to be unprofitable, we need terms in keeping with the methodological principles stated above. What is an 'actor'? Any element which bends space around itself, makes other elements dependent upon itself and translates their will into a language of its own. An actor makes changes in the set of elements and concepts habitually used to describe the social and the natural worlds. By stating what belongs to the past, and of what the future consists, by defining what comes before and what comes after, by building up balance sheets, by drawing up chronologies, it imposes its own space and time. It defines space and its organization, sizes and their measures, values and standards, the stakes and rules of the game – the very existence of the game itself. Or else it allows another, more powerful than itself, to lay them down. This struggle for what is

essential has often been described but few have tried to find out how an actor can make these asymmetries last, can lay down a temporality and a space that is imposed on the others. And yet the answer to this question is in principle quite simple: by capturing more durable elements which are substituted for the provisional differences in level s/he has managed to establish. Weak, reversible interactions, are replaced by strong interactions. Before, the elements dominated by the actor could escape in any direction, but now this is no longer possible. Instead of swarms of possibilities, we find lines of force, obligatory passing points, directions and deductions.²⁵

3.1 *Electricity of France and Renault: hybrids and chimera*

Let us take the case of the Electricity of France (EDF) which, in the early 1970s, was struggling to launch an electric vehicle. EDF ventures out onto a terrain that is new to it, with the aim of bringing the ideal electric vehicle into existence. It does this by redefining the totality of a world from which it will cut out what is natural and what is technical. EDF places the evolution of industrial societies as a whole in a black box and enrolls it for its own advantage. According to the ideologists within this public enterprise, the all-out consumption characteristic of the postwar years is doomed. Henceforth, the direction of future production must take into consideration man's happiness and the quality of life. With this vision of our future societies, the ideologists deduce that the petrol-driven car – which best symbolizes the successes and deadlocks of growth for its own sake – must now be doomed. EDF proposes to draw the conclusions from this 'ineluctable' social and economic evolution, gradually replacing the internal combustion engine with its electric vehicle.

Having defined the evolution of the social world, EDF next determines evolution of techniques, this being carefully distinguished from that of the social world: a new black box that is indisputable and ineluctable. EDF chooses to consider the VEL (Electric Vehicle) as a problem concerned with generators. Once these premises have been laid down, EDF marks out possible choices – which it evocatively calls 'channels'. Associated – always ineluctably – with each channel are a set of procedures, a set of laboratories and industrialists and – most important of all – a chronology. Lead accumulators, providing they are properly developed by this or that firm, could be used until

1982; the years 1982–90 will be the years of zinc-nickel accumulators and the zinc-air circulation generator; from 1990 onwards, fuel cells will be ready for use. These sequences of choices are made up of scattered elements taken from different contexts, gleaned by EDF's engineers, leaders and ideologists wherever they are available. From these scattered parts EDF creates a network of channels and regulated sequences.

Not content with making parallel connections between overall social development and technical channels, EDF begins to translate into simple language the products which industrialists cannot fail to want to produce, and the needs which clients and consumers cannot fail to feel. EDF foresees a huge market for lead accumulators, that of light commercial vehicles. Zinc accumulators cannot fail to be preferred for use in electric taxis, whilst fuel cells are certain to conquer the private car market as a whole.

In the space of a few years, and by dint of organizing channels, branches and developments, EDF begins to translate the deep desires, the technical knowledge and the needs and aptitudes of a large number of actors. EDF thus structures a reality by building up a gigantic organizational chart in which each black box, each carefully demarcated islet, is linked to other boxes by a set of arrows. The islets are shut off, and the arrows are unequivocal. Thus is the Leviathan structured. The actor tells you what you want, what you will be able to do in 5, 10 or 15 years, in which order you will do it, what you will be glad to possess, and of what you will be capable. And *you really believe this*, you identify with the actor and will help him or her with all your strength, irresistibly attracted by the differences in level he or she has created. What Hobbes described as an exchange of words during a period of universal warfare should be described more subtly in the following way: an actor says what I want, what I know, what I can do, marks out what is possible and what impossible, what is social and what technical, their parallel developments and the emergence of a market for zinc taxis and electric mail vans. How could I possibly resist when that is exactly what I want, when that is the correct translation of my unformulated wishes?

An actor like EDF clearly displays how the Leviathan is built up in practice – and not juridically. It insinuates itself into each element, making no distinction between what is from the realm of nature (catalysis, texture of grids in the fuel cell), what is from the realm of

the economy (cost of cars with an internal combustion engine, the market for buses) and what comes from the realm of culture (urban life, *Homo automobilis*, fear of pollution). It ties together all these scattered elements into a chain in which they are all indissociably linked. One is forced to go through them just as if a line of reasoning was being unfolded, a system developed or a law applied. This chain or sequence traces a *chreod* or a set of *chreods* which thus define the margin for manoeuvre enjoyed by the other actors, their positions, desires, knowledge and abilities. What they will want and be able to do is channelled. Thus the EDF, like every Leviathan, gradually deposits interactions. There now exists something resembling contents, and something resembling a container, the contents fluid and the container stable. Our wills flow into the EDF's canals and networks. We rush towards the electric engine just as the river water rushes towards the Seine along the stone and concrete pipes designed by the hydraulic engineers. Contrary to what Hobbes states, thanks to this preliminary mineralization, certain actors became the Form of the Leviathan's body and certain others its Matter.

And yet, as we have already stated, an actor is never alone, despite everything it has. In vain does it saturate the social world, totalize history and the state of wills, it can never be alone since all the actors are isomorphic and those it enrolls can desert it. One actor, for example, had its role redefined by EDF in the course of this vast connecting-up of necessities. Renault, which then produced petrol-driven cars, seemed to have a brilliant future ahead of it, and symbolized industrial success in France. EDF changed its destiny, taking away its future. Now Renault symbolizes industries doomed because of city congestion, pollution and the future of industrial societies. It must now – like the others – make changes in its intended production. Now Renault would like to make the chassis for the electric vehicles planned by EDF. This modest role suits the company well, and corresponds to what it cannot but want. So Renault goes along with what EDF wants, just like the rest of France, moving towards an all-electric future.

So far we have not said whether for EDF this is a question of something dreamed up by engineers, or a reality. In fact no one can make this distinction *a priori*, for it is the very basis of the struggle between the actors. The electric vehicle is thus 'real'. The actors that EDF has approached and mobilized to play the role of a firm founda-

tion – designed for them by EDF – thus adhere to the differences in level which the public enterprise has laid out. But now something happens which will help us understand what we have been seeking to explain since the beginning of this chapter, that is how relative dimensions are changed.

In a few years' time Renault will disappear as an autonomous actor. Together with the petrol engine, it is doomed, and has no option but to reorientate its activities – unless the landscape which EDF projects before and around itself can be remodelled. But can this be done? During the first few years Renault is unable to fight its way back against the EDF's predictions. Everyone agrees that the private car is doomed.

How can this black box be opened? As all sociologists agree, no one will want a private car any more. How can the situation be reversed? Who can reveal technical ignorance in the scenario of an enterprise which has a monopoly of production and distribution of electricity? In these circumstances the only possible conclusion is that Renault will fail, and one must begin as best one can to adapt to the new landscape, one without the thermal car. And yet Renault has no wish to disappear; Renault wants to remain autonomous and indivisible, itself deciding what will be the social and technical future of the industrial world. What EDF so firmly associates, Renault would dearly like to dissociate. So Renault begins the work of undermining the edifice, probes the walls, makes up lost ground, seeks allies. How can Renault transform into fiction what will – if it is not careful – become the reality of tomorrow? How can it force EDF to remain, as we say, 'on the drawing board'?

EDF stated that no one would want a thermal car any more. And yet, despite increases in petrol prices, demand for cars is growing all the time. These two elements, which EDF links together in a strong interaction, prove dissociable in practice. Oil prices can rise concurrently with demand for cars, concurrently with the fight against pollution and with city congestion. Renault's hopes rise once more, and it begins to translate consumer desires differently: now they want the traditional private car at any price. As a result the future is altered yet again: the electric car has no natural market. The word is out. The natural laws as interpreted by the EDF Leviathan are not the same as for Renault. The consumer, by his or her very nature, demands performances with regard to speed, comfort and acceleration that the

electric car will never approach. Already one of EDF's premises has been upset, a difference in level flattened out or filled in and one of the black boxes opened and profaned. Renault becomes bolder. If EDF's interpretation of social evolution can be thrown out of joint, perhaps the same is true of its knowledge of electrochemistry? Perhaps the technical demands could be altered?

Renault sets out on the long task of dissociating the associations made by EDF. Each interaction is tested, every calculation redone, every black box opened. The engineers are questioned, the laboratories revisited, the records re-examined, the state of electrochemistry called into question. EDF had chosen to simplify certain information and to incorporate masses of figures which Renault now considers contradictory. As a consequence the chronology is disturbed. For EDF the internal combustion engine was a dead-end. Renault discovers that, by using electronics, it can be perfected so as to be unbeatable for several decades. Conversely, EDF had mentioned channels with regard to zinc accumulators. Renault does the sums again, assesses the estimates, gets another expert opinion from the experts, and shelves the zinc accumulator technically so that, at the very best, it would be suitable to equip a few tip-lorries much later than planned by EDF. Similarly, what EDF called the fuel cell 'channel' was for Renault a cul-de-sac. Instead of being the chreod through which flowed the wills of the engineers, it became just a rut. Into it fell only those laboratories which backed the wrong technical revolution and placed all their hopes in the study of catalysis. Like the rivers in China which sometimes suddenly change their course, demands and technical channels are thus diverted. The industrial society was running towards an all-electric future. Now it continues its majestic course towards the private car with an improved thermal engine. As Renault grows larger its future looks more rosy than it ever seemed before this confrontation. EDF shrinks in proportion. Instead of defining transport and reducing Renault to the role of subordinate, EDF has had to retire from the field, withdraw its troops and transform the world which it was building out of an engineer's dream.

3.2 *The rules of sociological method*

This confrontation clearly displays how the Leviathan is structured, making no *a priori* distinction between the size of actors, between the

real and the unreal, between what is necessary and what contingent, between the technical and the social. Everything is involved in these primordial struggles through which Leviathans are structured: the state of techniques, the nature of the social system, the evolution of history, the dimensions of the actors and logics itself. As soon as sociological language avoids the assumption that there is an *a priori* distinction between actors, these combats are revealed as the fundamental principle underlying the Leviathan. Sociological analysis is nevertheless involved, since it follows the associations and dissociations, but it follows them wherever they are produced by the actors. The actors can bond together in a block comprising millions of individuals, they can enter alliances with iron, with grains of sand, neurons, words, opinions and affects. All this is of little importance, providing they can be followed with the same freedom as they themselves practise. We cannot analyse the Leviathan if we give precedence to a certain type of association, for example associations of men with men, iron with iron, neurons with neurons, or a specific size of factors. Sociology is only lively and productive when it examines *all associations with at least the same daring as the actors who make them*.

In the primordial conflicts we have just described, there are indeed winners and losers – at least for a while. The only interest of our method is that it enables these variations to be measured and the winners to be designated. This is why we stress so strongly that they must be looked at in the same way, and dealt with using similar concepts. What concept will enable us to follow the actors in all their associations and dissociations and to explain their victories and defeats, though without our admitting belief in the necessities of every kind which they claim? An actor, as we have seen, becomes stronger to the extent that he or she can firmly associate a large number of elements – and, of course, dissociate as speedily as possible elements enrolled by other actors. Strength thus resides in the power to break off and to bind together.²⁶ More generally, strength is *intervention*, *interruption*, *interpretation* and *interest*, as Serres has so convincingly shown.²⁷ An actor is strong in so far as he or she is able to intervene. But what is intervention? Let us go back to the Leviathan: You want peace, so do I. Let us make a contract. Let us return to the baboons: Sara is eating a nut. Beth appears, supplants her, takes her place and her nut. Let us return to EDF: a laboratory is studying the fuel cell. The engineers are questioned, their knowledge simplified and

summed up: 'we shall have a fuel cell in 15 years'. The Leviathan once more: we have made a contract, but a third party appears who respects nothing and steals from us both. The baboons once more: Sara yelps, this attracts her faithful friend Brian. He is now enrolled, he approaches and supplants Beth. The nut falls to the ground and Brian grabs it. The EDF once more: the Renault engineers read through the literature again and alter their conclusions: 'There will be no fuel cell in 15 years.' All this is still 'the war of all against all'. Who will *win in the end*? The one who is able to stabilize a particular state of power relations by associating the largest number of irreversibly linked elements. What do we mean by 'associate'? We return again to the Leviathan. Two actors can only be made indissociable if they are one. For this their wills must become equivalent. He or she who holds the equivalences holds the secret of power. Through the interplay of equivalences, hitherto scattered elements can be incorporated into a whole, and thus help to stabilize other elements.

3.3 'None is so fierce that dare stir him up: who then is able to stand before me?' (Job: 41,10)

By comparison with the Leviathan revealed by the sociologist, the one Hobbes describes is a pleasant idealization:

Art goes yet further, imitating that Rational and most excellent work of Nature, *man*. For by Art is created that great LEVIATHAN called a Commonwealth, or a State which is but an artificial Man; though of greater stature and strength than the Natural, for whose protection and defence it was intended; and in which the Sovereignty is an Artificial Soul, as giving life and motion to the whole body; the Magistrates and other officers of Judicature and Execution, artificial joints.²⁸

For the Leviathan is a body, itself designed in the image of a machine. There is a single structural principle – an engineer's plan – and a homogeneous metaphor which orders the whole, that of an automaton. The true Leviathan is far more monstrous than this. Is the Leviathan a machine? It is, but what is a machine without an operator? Nothing more than a broken-down heap of iron. So the metaphor of the automaton is not valid. If the machine can move,

build and repair itself, it must be a living thing. Let us move on to biology. What is a body? A machine once again, but there are many kinds: thermal, hydraulic, cybernetic, data-processing – from which the operator is again absent. Shall we say finally that it is a set of chemical exchanges and physical interactions? Can we compare it with the interest of a market or an exchange system? In the field of the economy with what is it comparable? Once again with chemical interactions. And these in their turn may be compared with a field of struggling forces. The Leviathan is such a monster that its essential being cannot be stabilized in any of the great metaphors we usually employ. It is at the same time machine, market, code, body, and war. Sometimes, forces are transmitted as in a machine, sometimes operating charts come into place in the same way as cybernetic feedbacks. Sometimes there is a contract, sometimes automatic translation. But one can never describe the whole set of elements using only one of these metaphors. As in the case of Aristotle's categories, we jump from one metaphor to another whenever we try to express the meaning of one of them.

Monstrous is the Leviathan in yet another way. This is because, as we have seen, there is not just *one* Leviathan but many, interlocked one into another like chimera, each one claiming to represent the reality of all, the programme of the whole. Sometimes some of them manage to distort the others so horribly that for a while they seem the only soul in this artificial body. The Leviathan is monstrous too because Hobbes built it using only contracts and the bodies of ideal, supposedly naked, men. But since the actors triumph by associating with themselves other elements than the bodies of men, the result is terrifying. Steel plates, palaces, rituals and hardened habits float on the surface of a viscous-like gelatinous mass which functions at the same time like the mechanism of a machine, the exchanges in a market and the clattering of a teleprinter. Sometimes whole elements from factory or technical systems are redissolved and dismembered by forces never previously seen in action. These forces then in turn produce a rough outline of a chimera that others immediately hasten to dismember. Neither Job on his dunghill, nor the teratologists in their laboratories have observed such dreadful monsters.

Impossible not to be terrified by this primordial combat which concerns everything that political philosophy, history and sociology consider indisputable frameworks for description. Impossible not to

be terrified likewise by the flood of speeches Leviathans make about themselves. On some days and with some people they allow themselves to be sounded or dismantled (depending whether they choose that day to be body or machine). Sometimes they sham dead or pretend to be a ruin (metaphor of a building), a corpse (biological metaphor), or a huge heap of iron from some museum of industrial archeology. At other times they are inscrutable and delight in admitting themselves monstrous and unknowable. The next moment they change and, depending on their audience, stretch out on a couch and whisper their most secret thoughts or, crouching in the shadows of the confessional, admit their faults and repent of being so big or so small, so hard or so soft, so old or so new. We cannot even state that they are in a continuous state of metamorphoses, for they only change in patches and vary in size slowly, being encumbered and weighed down with the enormous technical devices they have secreted in order to grow and to restrict precisely this power to metamorphose.

These imbricated Leviathans more resemble a never-ending building-site in some great metropolis. There is no overall architect to guide it, and no design, however unreflected. Each town hall and each promotor, each king and each visionary claim to possess the overall plan and to understand the meaning of the story. Whole districts are laid out and roads opened up on the basis of these overall plans, which other struggles and other wills soon restrict to the egoistic and specific expression of a period or an individual. Constantly – but never everywhere at the same time – streets are opened, houses razed to the ground, watercourses covered over. Districts previously thought out-of-date or dangerous are rehabilitated; other modern buildings become out of fashion, and are destroyed. We fight about what constitutes our heritage, about methods of transport and itineraries to be followed. Consumers die and are replaced by others, circuits by degrees compel their recognition, enabling information to run along the wires. Here and there one retires within oneself, accepting the fate decided by others. Or else one agrees to define oneself as an individual actor who will alter nothing more than the partitions in the apartment or the wallpaper in the bedroom. At other times actors who had always defined themselves and had always been defined as micro-actors ally themselves together around a threatened district, march to the town hall and enrol dissident architects. By their action they manage to have a radial road diverted or a tower that a macro-actor

had built pulled down. Or again, as in the case of the famous 'trou des Halles' in central Paris, they put forward 600 alternative projects, in addition to the hundreds the Paris Town Hall had already considered. A tiny actor becomes a macro-actor, just like in the French nursery rhyme: 'The cat knocks over the pot, the pot knocks over the table, the table knocks over the room, the room knocks over the house, the house knocks over the street, the street knocks over Paris: Paris, Paris, Paris has fallen!' We cannot know who is big and who is small, who is hard and who is soft, who is hot and who is cold. The effect of these tongues which suddenly start to wag and these black boxes that suddenly snap shut is a city, uncountable Leviathans with the beauty of the beast or of the circles of hell.

Hobbes's Leviathan was indeed a paradise by comparison with what we have described here. As for the baboons' Leviathan, it is a dream of the unadulterated society amid the beauty of the still-wild savannah. The monster that we are, that we inhabit and that we fashion sings a quite different song. If Weber and his intellectual descendants found that this monster was becoming 'disenchanted', this was because they allowed themselves to be intimidated by techniques and macro-actors. This is what we shall now show.

4 Conclusion: the sociologist Leviathan

In order to grow we must enrol other wills by translating what they want and by reifying this translation in such a way that none of them can desire anything else any longer. Hobbes restricted this process of translation to what we now call 'political representation'. The scattered wills are recapitulated in the person of the sovereign who says what we want, and whose word has force of law and cannot be contradicted. And yet it is a very long time now since 'political representation' was alone sufficient to translate the desires of the multitude. After political science, the science of economics also claims to sound loins and coffers, and to be able to say not only what the goods, services and people making up the Leviathan desire, but also what they are worth. In this article we are not interested in political science or economics. We are interested in the latecomers, the sociologists, who also translate – using polls, quantitative and qualitative surveys – not only what the actors want, not only what they are worth,

but also *what they are*. On the basis of scattered information, replies to questionnaires, anecdotes, statistics and feelings, the sociologist interprets, sounds out, incorporates and states what the actors are (classes, categories, groups, cultures, etc.), what they want, what interests them and how they live. Self-designated and self-appointed, spokesmen of the people, they have, for more than a century now, taken over from Hobbes's sovereign: the voice that speaks in the mask is their own.

4.1 The sociologist Leviathan

We have followed through the creation of the political Leviathan on the basis of a contract, the formation of the monkey-Leviathan and, last, the construction of the monster-Leviathan. Now we shall see how the sociologist-Leviathan is built. We can already state as a matter of principle that Leviathans formed like sociologies or sociologies like Leviathans.

So what do sociologists do? Some say that there is a social system. This interpretation of the social credits translation processes with a coherence that they lack. To state that there is a system is to make an actor grow by disarming the forces which he or she 'systematizes' and 'unifies'. Of course, as we have seen, the Leviathan's arithmetic is very special: each system, each totality *is added* to the others without retrenching itself, thereby producing the hybrid monster with a thousand heads and a thousand systems. What else does the sociologist do? He or she interprets the Leviathan, saying for example that it is a cybernetic machine. So all associations between actors are described as circuits of an artificial intelligence, and translations are seen as 'integrations'. Here again the Leviathan is built up by this type of description: it is proud to be a machine and immediately, like any machine, starts to transmit forces and motions in a mechanical way. Of course this interpretation is added to all the others and struggles against them. For the Leviathan is – sometimes and in some places – a traditional and not a cybernetic machine, likewise a body, a market, a text, a game, etc. Since all interpretations act upon it simultaneously, *performing* and *transforming* forces according to whether they are machines, codes, bodies or markets, the result is this same monster again, at one and the same time machine, beast, god, word and town. What else can sociologists do? They can say, for

example, that they 'restrict themselves to the study of the social'. They then divide the Leviathan into 'reality levels' leaving aside, for example, the economic, political, technical and cultural aspects in order to restrict themselves to what is 'social'. The black boxes that contain these factors are thus sealed up and no sociologist can open them without stepping outside the field. The Leviathans purr with relief, for their structure disappears from view, whilst they allow their social parts to be sounded. Of course, as we know (see the EDF), no actor is so powerful that its decisions and associations as a whole will be finally and definitely considered as technical reality. The other actors, helped by sociologists, push back and trace anew the boundaries between what is technical, economic, cultural and social. The result is that here again the Leviathans are hacked about by conflicting teams of sociologists, and are covered with scars like Frankenstein. What else do sociologists do? Like everyone else, they never stop working to define who acts and who speaks. They tape the recollections of a workman, a prostitute or an old Mexican; they interview; they hand out open and closed questionnaires on every subject under the sun; they unceasingly sound out the opinions of the masses. Each time they interpret their surveys they inform the Leviathan, transforming and performing it. Each time they construct a unity, define a group, attribute an identity, a will or a project;²⁹ each time they explain what is happening, the sociologist, sovereign and author – as Hobbes used the term – add to the struggling Leviathans new identities, definitions and wills which enable other authors to grow or shrink, hide away or reveal themselves, expand or contract.

Like all the others, and for the same reason, sociologists work on the Leviathan. Their work is to define the nature of the Leviathan whether it is unique or whether there are more than one, what they want and how they transform themselves and evolve. This specific task is in no way unusual. There is no 'metadiscourse' – to speak archaically – about the Leviathan. Every time they write sociologists grow or shrink, become macro-actors – or do not – expand, like Lazarsfeld, to the scale of a multinational,³⁰ or shrink to a restricted sector of the market. What makes them grow or shrink? The other actors whose interests, desires and forces they translate more or less successfully, and with whom they ally or quarrel. Depending on the period, the strategies, the institutions and the demands, the sociologist's work can expand until it becomes what everyone is saying

about the Leviathan, or shrink to what three PhD students think about themselves in some British university. The sociologists' language has no privileged relationship with the Leviathan. They act upon it. Suppose they state that the Leviathan is unique and systematic, suppose they create cybernetic, hierarchically integrated sub-systems: either this will be accepted, or not, will spread, or not, will be used as resources by others – or will not. The success of this definition of the Leviathan proves nothing about the latter's own nature. An empire is born, that of Parsons, and that is all. Conversely, the fact that ethnomethodologists might manage to convince their colleagues that macro-actors do not exist proves nothing about their non-existence. Sociologists are neither better nor worse than any other actors. Neither are they more external nor more internal, more nor less scientific.³¹ Common, too common.

4.2 *How to slip between two mistakes*

A macro-actor, as we have seen, is a micro-actor seated on black boxes, a force capable of associating so many other forces that it acts like a 'single man'. The result is that a macro-actor is by definition no more difficult to examine than a micro-actor. Growth is only possible if one can associate long lasting forces with oneself and thereby simplify existence. Hence a macro-actor is at least as simple as a micro-actor *since otherwise it could not have become bigger*. We do not draw closer to social reality by descending to micro-negotiations or by rising towards the macro-actors. We must leave behind the preconceptions which lead us to believe that macro-actors are more complicated than micro-actors. The opposite might be true as the example of the baboons showed us. A macro-actor can only grow if it simplifies itself. As it simplifies its existence, it simplifies the work of the sociologist. It is no more difficult to send tanks into Kabul than to dial 999. It is no more difficult to describe Renault than the secretary who takes telephone calls at the Houston police station. If it were much more difficult the tanks would not move and Renault would not exist. There would be no macro-actors. By claiming that macro-actors are more complex than micro-actors sociologists discourage analysis, and hamstring investigators. And they prevent the secret of the macro-actors' growth from being revealed: making operations childishly simple. The king is not only naked, he is a child playing with (leaky) black boxes.

The other preconception, too often shared by sociologists, is that individual micro-negotiations are truer and more real than the abstract, distant structures of the macro-actors. Here again, nothing could be further from the truth for almost every resource is utilized in the huge task of structuring macro-actors. Only a residue is left for the individuals. What the sociologist too hastily studies is the diminished, anaemic being, trying hard to occupy the shrinking skin left to it. In a world already structured by macro-actors, nothing could be poorer and more abstract than individual social interaction. The dreamers who would like to restructure macro-actors on the basis of the individual will arrive at an even more monstrous body for they must leave out all the hard parts which have enabled the macro-actors to simplify their lives and to take over all the space.

4.3 *More than a monster, a monster and a half*

What then is a sociologist? Someone who studies associations and dissociations, that is all, as the word 'social' itself implies. Associations between men? Not solely, since for a long time now associations between men have been expanded and extended through other allies: words, rituals, iron, wood, seeds and rain. The sociologist studies all associations, but in particular the transformation of weak interactions into strong ones and vice versa. This is of special interest because here the relative dimensions of the actors are altered. When we use the word 'study' we must make clear there is of course no suggestion of knowledge. All information is transformation, an emergency operation on and in the Leviathan's body.

When we slip between two mistakes, we do not intend to withdraw to some distant planet. What is valid for the others is valid for us too. We too work on the Leviathan, we too aim to sell our concepts, we too seek allies and associates and decide who it is we want to please or displease. By taking for granted differences in level and size between actors, the sociologist ratifies past, present and future winners, whoever they may be, finding favour with the powerful because they make them look reasonable. By agreeing to restrict the study of associations to the residual social, the sociologist affixes seals onto the black boxes, and once again guarantees that the strong will be secure and the cemeteries peaceful – filled with lines of hermetically closed black boxes crawling with worms.

For the sociologist then the question of method boils down to knowing where to place oneself. Like Hobbes himself, he or she sits just at the point where the contract is made, just where forces are translated, and the difference between the technical and the social is fought out, just where the irreversible becomes reversible and where the chreods reverse their slopes. There, only a tiny amount of energy is necessary to drag a maximum of information about its growth from the newborn monster.

The sociologists who choose these places are no longer anyone's lackey or ward. They no longer need dissect the corpses of Leviathans already rejected by others. They no longer fear the great black boxes which dominate the whole of the 'social world' where they no more wander like ghosts, cold as vampires, with wooden tongues, seeking the 'social' before it coagulates. The sociologists – teratologists – are in the *warm, light* places, the places where black boxes open up, where the irreversible is reversed and techniques return to life; the places that give birth to uncertainty as to what is large and what is small, what is social and what technical. They inhabit the blessed place where the betrayed and translated voices of authors – Matter of the social body – become the voice of the sovereign actor described by Hobbes – the Form of the social body.

Notes

- 1 T. Hobbes, *The Leviathan* (1651) (London: Pelican Books, 1978), p. 185. All quotations are from that edition.
- 2 *Ibid.*, p. 218.
- 3 *Ibid.*, p. 219.
- 4 *Ibid.*, p. 227.
- 5 *Ibid.*, p. 217.
- 6 Concept developed by Michel Serres, *La Traduction, Hermès III* (Paris: Ed. de Minuit, 1974), and then applied to sociology by M. Callon 'L' Opération de traduction', in M. Roqueplo (ed.), *Incidence des rapports sociaux sur le développement scientifique et technique* (Paris: CNRS, 1975).
- 7 Even the sacrificial victim of R. Girard, *Des Choses cachées depuis la fondation du monde* (Paris: Grasset, 1978), is nothing but a more solemn and cruel form of contract and a particular case of translation. It cannot be made the foundation of the other forms.
- 8 By the term 'actor' we mean, from now on, the semiotic definition by A. Greimas in *Dictionnaire de sémiotique* (Paris: Hachette, 1979): 'whatever unit

- of discourse is invested of a role', like the notion of force, it is no way limited to 'human'.
- 9 See the devastating criticism of psychoanalysis made by G. Deleuze and F. Guattari, *L'Anti-Oedipe, capitalisme et schizophrénie* (Paris: Ed. de Minuit, 1972). For them there is no difference of size between a child's dreams and a conqueror's empire or between the family life story and the political story. The unconscious, anyway, is not 'individual', so that in our innermost dreams we still act inside the whole body politic and vice versa.
 - 10 On this point, like on most, C. B. Macpherson, *The Political Theory of Possessive Individualism: Hobbes to Locke* (Oxford: Clarendon Press, 1962), missed Hobbes's originality. It is not Marxism that helps interpret what is beneath Hobbes's theory; it is, on the contrary, the latter that might explain what is beneath the former.
 - 11 See R. Collins (this volume) and P. Bourdieu (this volume).
 - 12 See the conclusion of this chapter.
 - 13 For instance A. Cicourel, *Method and Measurement in Sociology* (New York: Free Press, 1964), as an example of the requirements that tie the observer's hands. Ethnomethodologists have since much increased the constraints on what can be said about society.
 - 14 This part is based on an ongoing study on the sociology of primatology by one of us (B.L.). Most of this chapter is inspired by the work of Shirley Strum. She is in no way responsible for the awkward situation in which we put her baboons, but only for the new and revolutionary way she understands animal sociology. For direct references see S. Strum, 'Life with the Pumphous-Gang', *National Geographic*, May (1975), pp. 672–791; 'Interim Report on the Development of a Tradition in a Troop of Olive Baboons', *Science* 187 (1975), pp. 755–7; 'Agonistic Dominance in Male Baboons – An Alternate View' (forthcoming). For an analysis of the link between primatology and political philosophy, see Donna Haraway, 'Animal Sociology and a Natural Economy of the Body Politic', *Signs*, 4/1 (1978), pp. 21–60.
 - 15 Except insects, of course, Hobbes, *The Leviathan*, p. 225.
 - 16 *Ibid.*, p. 186.
 - 17 For two general presentations, see H. Kummer, *Primate Societies* (New York: Aldine, 1973); and T. Rowell, *Social Behaviour of Monkeys* (London: Penguin, 1972). For a historical background see Donna Haraway, 'Animal Sociology and a Natural Economy of the Body Politic', and 'Signs of Dominance: From a Physiology to a Cybernetics of Primate Societies, C. R. Carpenter 1930–1970' (forthcoming).
 - 18 S. Strum, 'Agonistic Dominance in Male Baboons – An Alternate View'.
 - 19 This was already visible in H. Kummer, 'Social Organization of Hamadryas Baboons' (Chicago: Aldine, 1968), and very clear in H. Kummer, 'On the Value of Social Relationships to Non-Human Primates. A Heuristic Scheme', *Social Science Information*, 17 (1978), pp. 687–707.
 - 20 This is the case either in the sort of Bourdieu sociology that Kummer used to describe his baboons ('On the Value of Social Relationships'), or in the sociobiological myth of defence of investments.
 - 21 Hobbes, *The Leviathan*, p. 183, for human, and Strum, 'Agonistic Dominance in Male Baboons – An Alternate View', for baboons.
 - 22 In his *Myth of the Machine* (New York: Harcourt, 1966), Lewis Mumford tries to integrate different sorts of materials, but he makes two major mistakes: first, he sticks to the metaphor of the machine, instead of dissolving it; second, he takes for granted the size of the megamachine instead of tracing its genealogy. The same thing can be said of A. Leroy-Gourhan, *La Geste et la parole* (Paris: Albin Michel, 1964), although he tries very hard to blur the limits between technics and culture, but favours, nevertheless, one sort of division and one sort of determinism.
 - 23 C. H. Waddington, *Tools for Thought* (London: Paladin, 1977).
 - 24 Michel Callon, *De Problèmes en problèmes: itinéraire d'un laboratoire universitaire saisi par l'aventure technologique* (Paris: CORDES, 1978); and *Rapport sur le véhicule électrique* (Paris: CORDES, 1978).
 - 25 For more complete descriptions, see F. Nietzsche, *The Will to Power* (New York: Garden Press, 1974); G. Deleuze and F. Guattari, *Mille Plateaux* (Paris: Ed. de Minuit, 1979); B. Latour, *Irréductions: précis de Philosophie* (Paris: Chêloteur, 1981).
 - 26 Hobbes, *The Leviathan*, p. 150.
 - 27 Michel Serres, *Le Parasite* (Paris: Grasset, 1980).
 - 28 Hobbes, *The Leviathan*, p. 18.
 - 29 For instance, see Luc Boltanski, 'Taxinomie sociale et lutte de classe', *Actes de la recherche en sciences sociales*, 29 (1979), pp. 75–110.
 - 30 Michael Pollak, 'Paul Lazarfeld, une Multinationale des Sciences Sociales', *Actes de la recherche en sciences sociales*, 25 (1979), pp. 45–60.
 - 31 The lack of distinction between soft and hard sciences is shown in B. Latour and S. Woolgar, *Laboratory Life: The Social Construction of Scientific Facts* (London: Sage, 1979).

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Toward an integration of micro- and macro-sociologies

Edited by

K. Knorr-Cetina and A. V. Cicourel



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Contents

Notes on contributors	vii
Preface	xi
Introduction: The micro-sociological challenge of macro-sociology: towards a reconstruction of social theory and methodology <i>K. Knorr-Cetina</i>	1
Part 1 The micro-foundations of social knowledge	49
1 Notes on the integration of micro- and macro-levels of analysis <i>A. V. Cicourel</i>	51
2 Micro-translation as a theory-building strategy <i>R. Collins</i>	81
3 Intermediate steps between micro- and macro- integration: the case of screening for inherited disorders <i>T. Duster</i>	109
Part 2 Action and structure: the cognitive organization of symbolic practice	137
4 Philosophical aspects of the micro-macro problem <i>R. Harré</i>	139

5 Agency, institution and time-space analysis <i>A. Giddens</i>	161
6 Social ritual and relative truth in natural language <i>G. Fauconnier</i>	175
Part 3 Toward a reconstruction of systems perspectives	203
7 Transformational theory and the internal environment of action systems <i>V. Lidz</i>	205
8 Communication about law in interaction systems <i>N. Luhmann</i>	234
Part 4 The production of societal macro-structures: aspects of a political economy of practice	257
9 Toward a reconstruction of historical materialism <i>J. Habermas</i>	259
10 Unscrewing the big Leviathan: how actors macro- structure reality and how sociologists help them to do so <i>M. Callon and B. Latour</i>	277
11 Men and machines <i>P. Bourdieu</i>	304
Index of names	319
Index of subjects	323

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