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Autonomy and Mastery:
Views of
"Modern Technology"
in the Early 20th Century

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perspectives on future societal developments, especially, as I shall argue, during and after the First World War.

Elsewhere, I have proposed to analyze this period as an extended "first crisis of modernity" (Wagner 1994). The term modernity there referred to the capacity, if not predicament, of human beings to give themselves their own laws, and to their inclination to increase their mastery over nature, over social relations and over themselves. Or, in other words, it referred to the double sign of *autonomy* and *rational mastery*, or what Castoriadis (1990) has called the imaginary signification of modernity. The social configurations of Western Europe and North America during the past two centuries could then be analyzed as being seen and lived by many of their constituent actors under this imaginary signification, though not without considerable variations and shifts in the understanding of it (Wagner 1994).

The first crisis of modernity referred to an extended questioning of this imaginary signification and a debate over its adequate translation into rules for social practices. Its temporary historical outcome, mostly achieved only after the Second World War, was what I call a "closure" of modernity, a reduction and formalization of the meaning of the imaginary signification which went along with a full inclusion of all inhabitants of Western societies under its rules. Contemporary technology debates were part of this major social transformation, in the course of which a certain understanding of technologies became predominant and the development of certain kinds of technologies was favoured.

The early-twentieth-century debates on the appropriation of technology, to summarize the conclusion of my argument very briefly, can be placed in the context of this first major crisis of modernity. This crisis had the impact of technology on society as one of its themes; and it resulted in a variety of intellectual ways of appropriating technology, only one of which was the "classic modern" one of focusing on formalization of action on nature and on human beings. After the Second World War, this view asserted itself as the predominant one, at least until it was contested again from the 1970s onwards in the broader context of a second crisis of modernity.

The dominant conception of technology that emerged during this closure of modernity was a rationalist, instrumental - ie, modern - one that focused on the functional efficacy of technical means with regard to the mere *enhancement* of human capacities. This conception tended to ignore or disregard more far-reaching views on the possibility of a transformation of human action and human social life through technologies. At the same time, the social restructuring furthered the development and collective use of technologies that formalized and channeled certain kinds of human action, making them more predictable and amenable to control. Without being able to know what was not developed, technologies that would have emphasized creativity and initiative seemed less favoured during this period, or, if so, the actions that were enabled by such technologies, and their effects, tended to be contained in the spaces created by more orderly technical systems.

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If such is the prevailing "modern" conception of technology after the Second World War, the main objective of this paper is to trace its emergence in the context of actual changes of technical development and usage as well as in the context of political debates. For that purpose, some general reflections on the relation of technology to modernity are required to create the discursive space in which different conceptions of technology could be elaborated (Section 2). During the nineteenth century this space was barely filled; the dominant views of technology during this period are briefly sketched to see how a situation was arrived at that demanded a new approach to technology towards the end of that century (3). This new approach placed its emphasis on order and control. Technologies were increasingly set up as technical systems covering social spaces and channeling human action into preconceived corridors (4). At the same time, political debate similarly took its distance from classical liberalism and focused on collectivities whose interests were seen as predetermined (5). Partly as a reaction against these developments, partly as an independent proposal to deal with the issue of technology, conceptions emerged that related technology directly to key questions of human existence (6). The First World War caused whatever vague consensus there may have been before to collapse (7) and produced a divergence of views both on social and on technical developments (8). Between the wars, the contours of the new, "modern" approach to technology emerged, particularly forcefully in the US; they were transferred to Europe strongly only after the end of the Second World War (9). Most recent technology debates, however, show that this approach meant nothing but a temporary closure of an issue that will reemerge, or maybe, has already reemerged (10).


## 2. Technology and Modernity

The marriage of the terms "modern" and "technology" has been as widely hailed as to make this linguistic couple almost unseparable. If modern, however, is supposed to mean more than just "most recent", then the adorers of this supposedly happy marriage have to be able to say what keeps the two together. What could be essentially modern about technology, if we accept the basic understanding of modernity proposed above, is that technologies might enhance autonomy and instrumental mastery. At first sight, this seems to be unproblematically true for many technical objects. Cars and airplanes, for instance, have allowed human beings to enhance their control over physical space as much as they enabled them to move about individually at greater distances from the social spaces they spend most of their everyday lives in. It seems thus perfectly suitable that these objects have been regarded as "heralds of modernity" in the first decades of our century (Gentile 1988: 108; Overy 1990).

Valid as it is as a first approximation, however, this reading is limited, mainly because it assumes both an unequivocal understanding of the two objectives and an

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unproblematic relation between them. It is somehow implied that the increase of autonomy would naturally go along with the rising control of humankind over the natural world and its laws, and that this linkage sufficiently characterized modernity. Of the double imaginary signification of modernity, however, both elements as well as the relation between them are inherently problematic.

The two terms create a problematique that we can understand as constitutive of modernity. The demand for autonomy frees the actual, living human beings (rather than humankind) from predetermined ascriptions; it enables them, but also demands of them, to self-determine their views of their own lives. By the same move, the call for autonomy creates contingency, a principally infinite openness as to the possible outcomes of such self-determination. Thus, it increases uncertainty about the rightness as well as the very livability of those outcomes; such uncertainty may well create insecurity and anxiety, the anxiety of existential loneliness, of the arbitrariness and senselessness of one's existence.[2] It does not seem implausible to conclude that the demand for autonomy whenever it was heeded provoked a renewed "quest for certainty" as a response (Dewey 1984; cf. more recently the arguments advanced by Toulmin 1990).

In this context, striving for "rational mastery" may be considered as the modern answer to this quest for certainty. Certainly, it is not, and has never been, the only answer. Political theorists as well as scientists of the seventeenth and eighteenth century, whose works one tends to regard as modern because they emphasized the autonomy of political deliberation or of the search for truth, often embedded their reasonings firmly into a religious, Christian or Deist, frame (Taylor 1989, esp. pp. 248-284). However, any such view would always face at some point in time the objection that it did not give full reign to autonomy. The concept of Reason or rational mastery meant to overcome the need for such framing which could always be regarded as the result of a rather arbitrary choice. Reason or rational mastery was supposed to substitute a procedural or instrumental criterion of universal validity for substantive ones which would always remain diverse and potentially mutually incompatible. As such, it appeared to provide a direction for the use of human autonomy, and thus recreated some certainty, without though, it was assumed, unduly limiting such autonomy.

What I have just described is, to a large extent, a modernist fiction. The conceptual pair of autonomy and mastery indeed liberated human beings and created the issue of contingency; however, against its own claims it did not succeed in resolving it again. It provided a language for discussing it; but a language is a way of ordering issues, not a solution to problems. What may be repressed in a particular order of words, will reappear in a different shape and at another location. The language that developed around the terms autonomy and mastery offered some

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[2] See Lefort (1988: 180) for such an argument. Significantly, this ambiguity of autonomy is also in the centre of Erich Fromm's *Escape From Freedom* (1941), written towards the end of the period under study here.

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conceptual possibilities of dealing with the contingency that the imaginary signification of modernity itself had created as a key issue. These possibilities will be discussed in the following, and the remaining part of this paper will be devoted to demonstrating how, in this conceptual space, "technology" has been intellectually appropriated as a mode of handling such contingency.

The idea of autonomy often tends to be equated with the freedom of the individual. Certainly, the latter is a key element, in some sense even a kind of foundation, of the discursive self-understanding of Western societies. However, one should rather say, more precisely, that the right of the individual to develop her own view of her life, the right to "self-realization", is socially acknowledged under modern conditions. How this right is exercised remains very open (for an extensive discussion see Taylor 1989). Self-realization can be read as giving priority to one's own goals at the possible neglect of "higher" values. In the latter variant, self-identity appears as highly individualistic, referring to the possibility of a choice of identity and of being responsible for that choice to oneself only. However, self-realization may also be conceived in a variety of quite different ways, which need not be individualistic at all. In romantic terms, it could mean the discovery of an inner self and the attempt to live up to that inner self's exigencies. This concept could, for instance, include the exigency to devote one's life to other persons. More generally, the goal of self-realization leaves entirely open the possibility to realize oneself as an existentially committed part of an entity greater - and, importantly, longer-lasting - than oneself.

To see oneself as an integral part of a collectivity may be important for alleviating some of the uncertainties of human existence, in two basic ways. First, the creation of an understanding of commonality with others provides recurring assurance in everyday interaction, allows to "go on" without having to question the meaning of routine situations. In a very basic sense, such world-view is, possibly, a precondition for human social existence, and it has been analyzed as such in Wittgensteinian philosophy and in sociological approaches developed under such influences (e.g. Wittgenstein 1969; Giddens 1984).

Second, and more specific to the historical context under study here, the larger collectivity may be endowed with higher meaning, resolving the issue of the contingency of one's own individual existence by creating a kind of worldly transcendence. During the nineteenth century, two specific collectivities have been imagined, created and used in such a way, namely nation and class. In many of its initial formulations, these concepts referred to historical proximity or similarity of socioeconomic condition of human beings. During the second half of the nineteenth century, however, they were increasingly linked to ideas of historical mission and to conceptions of social ties that were not merely regarded as intersubjective, but as objective and natural.

While the imagination of a strong collective of belonging resolved the issue of contingency by means of reembedding the individual into a meaningful social

context, there is also the inverse solution of not reducing but enhancing individuation. Where the former made the obligation of self-realization manageable by limiting its scope, the latter elevated this idea to become the highest objective itself. The more radically and completely "every human being [was] consciously or unconsciously acting out an idiosyncratic fantasy," as Richard Rorty (1989: 36) puts the Nietzschean-Freudian notion of self-creation, the more he lived up to the exigencies of self-realization. Rather than denied or limited, contingency is here radically affirmed. The only deplorable fact about human existence is the historical, social and material limits to live lives "which are pure action rather than re-action," to use Rorty's terms again (p. 42). If reference is made here to Nietzsche and Freud, it may be noted, that is to show that such conceptions were proposed at the same time as the conceptions of the strong collective were put forward--at this historical turn which I propose to analyze as a first extended crisis of modernity.

The complementary term of mastery may be subjected to a similar broadening of its possible references. For the sake of simplicity, I will again just discuss two aspects of rational mastery. First, we may ask what mastery is supposed to entail. There are at least two, highly different possibilities. On the one hand, the term may refer to the extension of the reach of human action, to new enablements which are, for instance, achieved by more rapid transportation technologies. Such increase of mastery will rather increase contingency since it is likely to involve an uprooting of existing orders, new dangers and risks. Metaphorically, and sometimes literally, it can be characterized as a venturing into uncontrolled spaces. On the other hand, increase of mastery may refer to the extension of control over an existing space. In this respect, increase of mastery will spell decrease of contingency; it will enhance predictability, establish new modes of assurances, and may give a sense of heightened security.

The second question asks what it is that is to be mastered. The first association with technology is often the idea of the mastery of nature. This idea presupposes the conceptual separation of the natural from the social world, itself a very debatable, and far from self-evident, modernist achievement (see Latour 1991). It will be shown that the technology debates in the early twentieth century often did not accept this separation and moved the human being back into a worldly whole of which "nature", human beings and technology all were unextricable parts. Even if one decided to uphold the distinction between the natural and the social, however, the very least one would have to do is to conceptually introduce the possibility that mastery may also refer to social relations and to the self. This move is important because it allows to recognize, even within a modernist frame of reference, that the enhancement of mastery for some may reduce the ability of others to self-determine their lives. Furthermore, it shows that the notions of liberty and autonomy have their counterparts in the terms discipline and control. The control of certain aspects of social relations or of one's self may become a prerequisite for living a life according to the images and preferences for which one has settled.

Even if this brief sketch reasoned in highly abstract terms, it should now be easy to see that the relation of autonomy and mastery can take a considerable variety of forms depending on the prevailing understandings of either of the two terms. A complex space of possibilities was created in which a debate about modernity could unfold. We are now able to explicitly return to the technology question in modernity.

The views on technology voiced during the early decades of the twentieth century can fruitfully be analyzed, as I will try to demonstrate, as varieties of ways of dealing with a historical perception of a radical increase of contingency during the nineteenth century. All these ways show the inescapability of the condition of modernity, since they can be read as variations of the double imaginary signification of autonomy and mastery. However, they do indeed display remarkable variations of this theme. Some strengthen the individual understanding of autonomy, whereas others propose and enhance a collectivist reading of this term; some intend to extend the instrumental mastery of the natural or of the social world, whereas others intensify possibilities of mastery of the self. In many readings, specific technologies such as were developed and used early in this century were an important ingredient in elaborating and supporting the particular view of the "modern" world, namely in establishing a viable linkage between autonomy and mastery. The possibilities of dealing with contingency that were being outlined in this debate have established specific such linkages each. They have marked a field of possibilities of dealing with technology in which we still move, though significantly not very close to either of the extremes. In the following, I shall try to elaborate this argument by placing it back into its historical context.

## 3. The Social Imagery of Technology During the Nineteenth Century

Like in many other respects, the social configurations of the first half of the nineteenth century were radically divided over their views on technology. After the onset of what has come to be called the Industrial Revolution, the invention and introduction of new, powerful technologies for production and transportation was widely hailed as a triumph of the creative power of man. Even during that period, though, there was no lack of critics. "The machinery question," as Maxine Berg (1980: 3) has suggested, "stood at the centre of the stage of social, political and intellectual conflict in the early nineteenth century" (cf Mithander 1991). Romanticism is often regarded as a first literary-intellectual reaction against the spread of industrial technology; and the sorcerer's apprentice as well as Goethe's version of the Faust story are early examples of the recurrent "technics-out-of-control" theme in social thought (Berman 1983; Sieferle 1984; Winner 1977)

More specifically, there is a social division over industrial technology. "Creative man" was incarnated in the figure of the bourgeois entrepreneur. He was a property-owner, and he was male, both features being widely seen as preconditions

of an existence as a responsible, active and creative individual. In contrast, many workers and their families witnessed the introduction of new technologies in connection to the deterioration of living conditions in general and conditions at the workplace in particular. Luddism has become a generic term for the radical rejection of new technology. It was counterposed to the conviction that technological development as such marked progress, a view that can be called the dominating perspective among established intellectuals throughout most of the nineteenth century.

Karl Marx and Friedrich Engels' *Communist Manifesto* of 1848 remains one of the most telling accounts of the transformation of a social configuration by a specific social class and by means of technology. No great interpretive effort is needed to read a deep fascination for the transformative power of the efforts of this class - cum -technology into this account. At the same time, this text, together with the related 1845 account by Engels on *The Condition of the Working Class in England*, marks a transition in the thinking about technology. It offered those who appeared to be suffering from this transformation a perspective beyond the mere rejection of the machine. It was suggested that there were indeed potential benefits in the machines but that the technological advances needed to be socially appropriated, namely by a radical restructuring of society. Upholding the radical critique of the class who had invented those means and had put them to first use, technology was no longer the culprit responsible for all evil. The "development of the productive forces" meant progress indeed in the Marxian view; however, the social utility or damage of technology depended strongly on the ways it was used (not to speak of the fetters bourgeois relations of production imposed on the productive forces).

Without stressing words too much, it is significant indeed that "the machinery question" of the first half of the nineteenth century was succeeded by "the social question" in the second half. Both political economy, the discourse on society that reigned supreme among the commercial classes, and its socialist critique shared the view that it was neither technological nor economic rules and rationalities as such that were problematic but the social context that governed their workings and effects. Mid-century, thus, marked a point of comparatively high acceptance of technology (Mithander 1991: 11). During the following decades political-intellectual attention was refocused onto issues of social reorganization, this debate being increasingly structured by the opposition between established, liberal-bourgeois and aristocratic, elites and the organizations of the workers' movement in many countries. At the same time, this period was marked by strong industrial development, in the USA and Germany in particular, and by what later became called a new wave of technical inventions, the Second Industrial Revolution.

This is not the place to describe the effects of these changes on the social configurations in any detail, nor to repeat accounts of the dislocation of large parts of the population, of the growth of industry and the emergence of industrial cities, or of the formation and rising strength of the workers' movement, its parties and social

theories in the second half of the nineteenth century. Suffice it to say that these processes, reordering social practices and disembedding individuals from the social contexts in which they had grown up, uprooted social identities and created widespread uncertainty about individual life chances. Many of these developments had evident links to technology, and they tended to alter the view of, and attitudes towards, technology again, even if only gradually. Among the elites, at least among the more prudent and conservative parts, doubts grew whether they were not themselves growing the seeds of disorder and instability into a social configuration which they dominated. "Mechanical invention was an important part of the bourgeois-liberal world-view [...]. Yet the same bourgeois idealism that gave rise to the striving for order encouraged a progressive scientific and technical culture which threatened disorder. [...] In a world of increasing uncertainty, the disintegrative impact of radical invention was all the greater" (Overy 1990: 73).

This quotation refers to the effect of technology that I have referred to above as the extension of the reach of human action. Though desired, this effect is disturbing since it tends to shake established conventions and increase contingency. Also during the closing decades of the nineteenth century, however, a different view on the possible use and effect of technology gained in importance, not least among those engineers, entrepreneurs and administrators who were actively engaged in putting technology to use. It was recognized that technical means could be deployed in such a way as to structure and organize an entire set of social practices. This means that materially predefined rules of action would be extended to a social space so as to cover it--or one kind of actions in it - completely. Not extension, but control of human action is the main effect of technologies deployed in such a way, and the intention is to decrease contingency and enhance predictability.

Though any brief categorization will tend to be caricatural, it may be dared to say that the prevailing perception of technique early in the nineteenth century was that of individual machines or factories, which, though they were growing in size and power, were handled, supervised and controlled by individual human beings, be they workers or entrepreneurs. Towards the end of the century, starting possibly with Marx (Berg 1980: 340-1), this view had clearly given way to one which emphasized the technical, economic or social connections between the single elements and, thus, the functional--or, as some would say, in the long run dysfunctional--interrelatedness of those elements as parts of a system. This new view contains elements of a way of reappropriating technology, though they were not yet realized during the nineteenth century. After the innocent conception of harmonious technical progress was shaken, a view of technology as a mechanically or systemically integrated large system could be a means to restore order, or rather to bring about a new and better order. Inventors and innovators sometimes saw themselves as builders of new systems that would put society itself on a different footing and would point to ways out of the dilemmas that rapid and uncontrolled industrialization had produced (Hughes 1989, chap. 5).

## 4. The Building of Technical-organizational Systems

To grasp the background to these changes in debates, we shall briefly look at two of the key issues in accounts of the social transformations during the later nineteenth century which are closely related to the development of technology. These are those restructurings of allocative practices that have come to be labelled the Second Industrial Revolution, on the one hand, and the emergence of the oligopolistic, managerial enterprise, on the other. The former refers to the applications of insights into electricity and chemistry and to new forms of transportation related to the combustion engine and the telephone (see Landes 1969; Hughes 1989; Radkau 1989). Organizational changes went along with material changes. The years before and after the turn of the century witnessed the emergence of the large-scale, increasingly managerial, enterprise and proposals for the planned restructuring of the production process labelled Taylorization (see, e.g., Piore and Sabel 1985; Noble 1977). I shall not reiterate familiar themes of these transformations here, rather focus on certain features of these reorganizations that are essential to understand the perceptions of technology.

As I briefly indicated above, the late nineteenth century has often been described as an era of technical innovation. The first two quarters of the twentieth century, in contrast, were mostly characterized by the permeation of society with the technologies invented before.[3] Elsewhere I have argued in more detail that this distinction of periods, if valid, can be related to a long process of social sedimentation of innovations which occurred as a part of a stabilization of an entire socio-economic paradigm. In this perspective, the so-called late-nineteenth century wave of innovations was related to a major transformation of social practices, which I labelled the transition from restricted liberal to organized modernity (Wagner 1994: 77-81).

Concerning the uses of technology, this transition can, very schematically, be characterized as a movement from an emphasis on the extension of the reach of human action to a stress on the control of social and natural spaces. The reach of action over spaces was to be controlled by establishing a material connection or by strengthening the chains of unambiguous interaction. In principle, interaction chains had assumed global extension since the era of the discoveries. With nineteenth- and twentieth-century means of transportation and communication, however, long interaction chains acquired more of a routine character, and they were much more standardized. Modern institutions often established unambiguity of interaction from the beginning and upheld it all the way along the chain. They did so mainly by two means. First, they brought the information or commodity that was handled into a shape that was transportable with the technique to be applied. This process meant a

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[3] The major exceptions are the television, though preceded by the radio, and nuclear energy (cf Radkau 1989: 222-39).

work on the commodity that entailed a reduction to some basic characteristics. Storage and transportation possibilities, for instance, altered food markets and allowed their de-localization. Economies of scale then led to the mass-produced foods that have become typical of this century.

Second, it was tried to insure that the way along the interaction chain was closed, that no other, outside interference could occur. The material means of such closure have been the iron tracks for the railway system, the wire for telephones or, later, the concrete tracks for the highway system. By such means, the reachable distance is extended considerably, and at the same time the permissible paths and access-points and also the micro-behaviour of individuals inside the system are rigidly prescribed, and communication and renegotiation about the rules of such behaviour is virtually precluded. Furthermore, a boundary is erected between those inside and those outside. For example, the inhabitants of a village without access-point to the rail or high-velocity road system is further removed from the other members of society than they had been before.

Key features of such material practices are their simplicity and their independence. By the former, I mean that they de-structured more complexly related interactions and recomposed them in pre-conceived, more orderly and predictable ways, often appearing as uniformity once such a practice had become socially dominant (Radkau 1992: 13-14). By the latter, I refer to their de-localized character. Such technologies are conceived to be applicable universally, once certain minimal requirements are met. With this double character, being simple and independent, they could take the form of "systems" that could be imposed on a local field of action. In these terms, the second half of the nineteenth and the first half of the twentieth century can be characterized as a period in which social space (literally) was "perforated" by technical networks, from the railroad to the telephone and electricity networks to car-usable road networks to radio and television broadcasting systems. The growth of these "primary" technical systems was always based on economies of scale, in one sense or other. The cost of building and/or maintaining a system could be so high that it could only be run cost-efficiently with mass usage. Or a system would only be attractive to users if it had wide coverage like the telephone network, or the broadcasting systems for advertisers. And a wide extension of such networks would provide growth paths for producers of equipment to use them, such as cars or electrical appliances. All these features entailed a move towards standardization of products and homogenization of patterns of behaviour.

A particular example of a social technology showing similar features is the reorganization of production through "scientific management," later called Taylorism and, related to it, the assembly line associated with the name of Henry Ford. Two main reasons are usually given for the social attractiveness of Taylorism. The first is that it increases efficiency and productivity; the second is that it expropriates the workers not only of their skills but also of their control over the work process. Naturally the first argument tended to be used for the employers' side, the second for

the side of the workers' movement. While for both arguments something can be said in favour, I would like to stress another, more general aspect of Taylorism. With its minute decomposition of human movements, scientific management ended up reducing every action into a limited number of component parts. The production process would then be reassembled from these known and measurable parts. In theory, scientific management had complete knowledge of the labour process at its disposal. Such knowledge could then be used for a variety of purposes, may they be called efficiency or expropriation of the workers' power. At its basis, however, is the establishment of order and certainty, stability and predictability, on a recalcitrant reality in the factory.

These uses of technology went along with the appearance, in the last half of the nineteenth century, of "a new form of capitalism [..] in the United States and Europe" (Chandler 1990: 1; cf Chandler and Tedlow 1985; Kobayashi and Morikawa 1986). Until then, practices of allocation had been shaped by comparatively small enterprises, which were seen as competing on markets via the prices of their products. Often these companies were directed by the owner who himself possessed the craft or engineering knowledge that was the foundation for the company's production. Towards the end of the nineteenth century, the average size of the firm had grown sharply, partly through direct organizational expansion, partly through mergers. Increasingly, personally owned companies were transformed into or replaced by joint-stock firms, and a new group of economic actors emerged, the salaried managers.

The emergence of the modern, big business enterprises may be related directly, as Chandler (1990: 51-70) does, to organizational requirements for managing new technical systems, such as railroad and telegraph systems. Subsequently, then, the existence of this new organizational form allowed and stimulated mass production and mass marketing. It will not suffice, however, to point to technical innovations as main cause for the growth of firms, since some of these techniques showed a long "maturation" period before they were widely applied. The growth of firms, though, can more precisely be located in time as following on the long depression at the end of the nineteenth century (1873-1895). Organizational expansion can be analyzed as an escape from the vagaries of the markets under competitive capitalism.

If the share of a firm's product on a market is increased, then the possibility for controlling the market is enhanced. All economic theorizing that concludes on automatic equilibration and maximization via markets has to assume that economic actors are exposed to the workings of the market without being able to strategically shape it. Big firms, however, establish a new kind of economic agency when they are able to influence the conditions of market exchange owing to the size of their own share. Through this kind of organization, companies do not merely benefit from economies of scale, if narrowly understood in technical and economic terms, but they produce a social advantage, namely manageability on their own field of action.

Later in the twentieth century, when the modern business enterprise acting on oligopolistic markets had become the dominant type of firm, it has repeatedly been argued that the development of advanced capitalism is much less associated with market competition and dynamic entrepreneurship than with increasing organization of production and distribution. The move towards organization should indeed be seen as an attempt to control conditions of action in a general context of fluidity and change. "Risk avoidance and organizational stability [...] is the usual device of large organizations and firms." (Lehner 1983: 439-40)

This reaction on the part of "capital" is thus not so much unlike the parallel one on the part of "labour", namely to organize a share of the market (for products or for labour) as big as possible to rather control it instead of being exposed to it (Offe and Wiesenthal 1980). It is a move to re-establish certainty under conditions of great uncertainty. Following the principles of bureaucracy, big organizations try to cover as much of the relevant field of action as possible, and to structure their actions on this field according to clear and fixed, hierarchical rules.

Such ways of elaborating and using - material as well as social - technologies are part of a major change of a social configuration, a strong shift in emphasis among some of the main principles that orient action. Depending on the analytical emphasis, there are various ways of describing this shift. One may talk, as above, about a shifting direction of technology use, from extension of reach to control of space. In a very similar way, public debate about societal reorientation at the time referred to a shift from external to domestic, or interior, colonisation. The increasing emphasis on organization and predictability is also expressed as a turn away from individualism toward collectivism, an issue to be debated in the following section.

However, the broad historical pattern of technology use that I try to carve out should not be misread as a strong scheme superimposed on diverse and conflict-ridden social realities. Technologies that deviate from the historical pattern - though less in their character of being part of systems than rather in the forms of usage - are, for instance, the car and the telephone. Historically, the diffusion of both techniques falls squarely into the period at issue here, the car as a product being even the prime example for the emergence of an "organized" production and consumption pattern. However, the forms of use both techniques allow may be highly individual and private, and were early on recognized as such by the users. In both cases, early restricted patterns of use, such as for military and for business purposes, were soon exceeded, and these techniques became the symbols of independence, autonomy and individuality. The car-and-road system even tended to supersede and replace a transportation system that was much more collectively arranged, the railroad. As we shall see in detail later, the specific character of such techniques and their uses provided them occasionally a special position in the debates on technology. Furthermore, the de facto, though mostly untheorized, recognition of their difference allowed to break up "the question of technology," to remove it from a position where

the answer to it would determine the fate of society and humankind to one where there could be a variety of technology-specific answers.

The technology debates during the early twentieth century can, in general, nevertheless fruitfully be analyzed in the terms introduced above, in terms of a dominant shift towards issues of organization, collectivity and control. This shift, however, was accompanied by different, partly directly opposed views which emphasized autonomy, individuality and freedom. The breadth of technologies the wide experience of which was relatively new offered examples to support the former as well as the latter view. For this very reason, those technology debates have opened a very wide space of possibilities to talk about technology. In the following sections, I shall try to reconstruct this discursive space.

## 5. Technology and the End of Liberalism

At about the same time when technologies became increasingly perceived as interlocking, systemic arrangements that could serve for ordering and controlling physical and social space - and less as single tools enhancing human power for freely chosen purposes - the predominant view on the relation of individual human beings to the social configuration shifted in an analogous direction.

Generally, the latter nineteenth century can be analyzed as a period of a decline of the hegemony of classical liberalism. The prevailing political view of mid-nineteenth century saw the liberal individual as active part of a national setting in which he, among other things, used technologies to realize his self. This world-view insisted on the autonomy and responsibility of the individual, even if the extension of this view was typically restricted and women and workers largely excluded. Social movements of the latter half of the nineteenth century demanded full inclusion of all individuals under such conceptions. Faced with such demands and incapable to reject them, classical liberals saw the emergence of mass society in which the active attitude of the bourgeois individual would be undermined.

Until about the First World War, broadly liberal positions maintained a stronghold among members of the intellectual establishments. Socialist reasoning was growing, but either it developed close ties to liberal ideas and milieus, such as in England and France, or it was kept off institutional positions of importance, such as at German universities. However, liberalism had lost all of the enthusiasm which its promoters had shown through much of the nineteenth century. In many cases, awareness had grown that the basic concepts of liberalism had to be strongly reconsidered; classical sociology, for instance, is marked by such views (Seidman 1983).

In the perspective outlined above, much of the history of the European nineteenth century can be read as an increase of the awareness of contingency.[4] Towards the end of the century, this feature of the "modern condition" provoked strong efforts at decreasing such contingency. As a political theory that kept many issues open and contingent as a matter of principle, and as a political practice whose effects were often seen to be dissolving traditions and certainties, liberalism was attacked from two angles. On the one side, the commercial elites who had, to a large extent, supported classical, restricted liberalism, meant to recognize that their own practices, if continued without control, undermined the foundations of the social order. On the other side, the social movements which demanded inclusion did so in the name of collectivities, rather than individuals, and were accordingly open to redefinitions of society as a collective order.

Such collectivist options, of which there were many discursive variants as well as a number of different ways to inscribe them into laws and institutions (see Ewald 1986; Rabinbach 1994), often drew support from an analysis of technology and economy that held that the industrial mode of production had changed social relations to such an extent that individuals could no longer be regarded as exclusively responsible for their actions since they had come to occupy predefined places in a larger, functionally related order. A view emerged emphasizing that humankind was now exposed to technical dynamics; that masses were being organized in rationalized, homogeneous orders; and that the individual was lost. To such a view corresponds a machine image of society, which - while the idea is much older - gained increasing acceptance during the early decades of the twentieth century (cf Marz 1993).

Max Weber's use of the metaphor of the "iron cage" is a - significantly cautious - example of such a conception. Though he applied this term specifically to bureaucracy, he clearly had a view of the formalization and rationalization of human action more broadly understood. Already at Weber's time, Oswald Spengler indeed fused "the metaphorics of the machine with the rejection of liberalism" by arguing that the exigencies of technology demanded to put an end to soft-spoken liberalism (Maier 1970: 44). Later critics of the mass society, such as Max Horkheimer, Erich Fromm and Hannah Arendt, would similarly elaborate on this metaphor and, turning it negatively, would speak of human beings as "cogs in the machine" of industrial mass capitalism, of the subordination of man to the rhythm and logics of the machine.

Theorists of society as a machine detected a new rationality in the emerging social configuration, whether they welcomed it or deplored it. This new rationality, in a view such as Weber's, entailed rationalization in the sense of a loss of

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[4] Cf. Berman 1983. The term "increase" should not be read in linear, much less evolutionary, terms. As Toulmin (1990) argues quite convincingly, historical periods of rather great certainty may alternate with periods of awareness of contingency. Any such sequence is tied to events rather than to a direction of history.

communication and consensus about ultimate values, the well-known "disenchantment" of the world. Weber tried to weigh the enablements brought by such machine organization against the constraints; and interpreters have remained undecided as to the conclusions at which he personally may have arrived. Certainly, he saw in the enablements one of the causes for the historical emergence of this phenomenon, since human beings chose it for its advantages as to the possibilities for rational action. In the views of critical theorists, in contrast, the rationality is always socially more one-sided, it is seen as the rationality of the ruling classes and as the logics of the capitalist order. Both interpretations, however, are basically as rationalistic as the machine metaphor may indeed at a first look suggest.

For others, however, it was not least these technologies of the modern age that brought a kind of reenchantment, one that was directly linked to the suprahuman powers of the machine. Generally, such thought was not alien to Weber, much of whose work can indeed be read as a personal struggle, which remained undecided until his death, between a rationalistic and a Nietzschean reading of the modern times (Peukert 1989). However, no intellectual of his age, grown up in nineteenth-century debates, would link the desire for enchantment positively to machines. Some authors of Weber's time, but of a much younger generation, though, went into this direction, and fell into a much different tone. Their writings provide us with the possibility of pointing to ways of appropriating technology that have rather not become dominant in those configurations of modernity that have developed historically, but that may remain relevant for understanding the relation between human beings and the objects of their creation.

## 6. Technology and Revelation

The fin de siècle was shaped by the feeling that the nineteenth century had come to a close not merely in temporal terms but that it had exhausted its energies and moved into a deadlock. While classical liberalism had clearly been superseded, the collectivist arrangements that had increasingly been introduced in its stead were sometimes not seen as providing an alternative, rather as stifling cultural potentials. This mood prepared the way for a new liberation in aesthetic terms that was not least inspired by technical developments.

Among such currents, Italian futurism is best known for its unmitigated praise of technology. In the terms of Emilio Gentile (1988: 107), futurism developed a mythical image of modernity as an explosion of human and material energies. The machine is here far from being an iron cage, rather it enables human beings to grow beyond their own physical capacities and to reach higher regions of being. Without doubt, there is a tragic element in such views, since humans are reduced in size and importance, and they cannot escape this situation. At the same time, though, they

have shown their greatness by creating exactly those objects and by merging with them to live new kinds of experience.

According to futurism, as in many other views of the time, technologies have outgrown human beings. Rather than an ally, technology has become the master of humankind (Nazzaro 1987: 78). It teaches and disciplines human beings: "The machine gives lessons in order, in discipline, in power, in precision and in continuity," as Marinetti said in 1924 (Masini 1988: 309). It even demands the ultimate sacrifice: "Blood is the oil that the wheels of the machine need that flies from the past into the future," Papini wrote in 1913 (Gentile 1988: 114). But technology does not simply subjugate human beings, it elevates them to greater heights, which are inaccessible without it.

In this sense, it is indeed appropriate to analyze futurism as a "religion of technology" (Tessari 1973: 209). Technology is a higher entity which is praised because it provides revelation and redemption. More generally, we may speak here of a metaphysical conception of technology, which by far was not specific to futurism. Technology becomes being seen as something bigger and longer lasting than an individual human being who, in turn, becomes part of that structure and fits into it. This is a position which hitherto was reserved for openly transcendental phenomena - such as God, nature, and reason -or for highly valued sociohistorical phenomena defining individual identities, such as the family, the nation and - as an intellectual creation of the workers' movement - social class.

In Germany, Ernst Jünger developed a related cosmological vision around the experience of industrial work. In contrast to the futurist praise of the machine, however, for Jünger both machine and man together develop a new form (*Gestalt*) of higher, "existential" being which overcomes the limits and contradictions of bourgeois society. "Technology is the domination of a language which is valid in the domain of work. This language is no less meaningful, no less profound, than that other sort which belongs not only to grammar but to metaphysics. Here the machine just as much as man himself plays a secondary role. It is only the organ through which this language will be spoken." (Jünger 1932: 150; cf. Orr 1974)

Jünger insisted that this *Gestalt* is impossible to describe, since it has no qualities and no inherent values. One may read him as trying to develop a worldly metaphysics: no substantive transcendental elements are given, but the idea of an ultimate orientation in life beyond mere existence is maintained, an orientation which is to be found in the form of the interaction of machine and man. The peculiar force of his writings stems not least from the fact that he couches in mythical, heroic language what otherwise could be read as a sober praise of functional efficacy. Where Weber struggled with the peculiar irrationality of rationalization without substantive objective (Löwith 1982: 41), Jünger turned technical rationalization back onto itself and elevated it to higher meanings.

Like Jünger, Martin Heidegger saw humankind in an unprecedented confrontation with technology in the 1930s, one which would change the human

condition entirely. The basis for his thought was the insight that technology that had outgrown human beings was no more merely a means to something, but "a way of revealing" (*eine Weise des Entbergens*; 1982: 12). Rather than being placed in a frame of human ends and purposes, technology enframed human action. That is why any merely instrumental and anthropological perspective on technology would turn out unsatisfactory; in these terms Heidegger indeed marks the core of the technology debate and its, post-Second World War, outcome (1982: 23-24 and 6). During the 1930s, Heidegger thought that humankind might live up to this challenge: "the ominous frenzy of technique let loose [and] the rootless organization of standardized man" (1959: 37), as visible both in the United States and the Soviet Union--and rise to a new condition. After Nazism and war, he had rather given up any concrete hope and focused on the arts as a way of questioning technology (1982).

In a short essay like this one, there is no way to do justice to the subtleties and complexities of conceptions of technology in those debates of the early twentieth century. With the sketch of positions given up to this point, however, we are now able to map the discursive space of possible appropriations of technology as it was constructed during this period.


## 7. Technology, Man and Society in the Early Twentieth Century

It may be recalled that the very schematic discussion of views on technology in the nineteenth century had left us with two basic positions. Either, in the bourgeois progress perspective, technology was seen as liberating human beings from the limitations of their natural endowments and enhancing autonomy and mastery of the world. Or, technology itself needed to be liberated from its bourgeois appropriation to unfold its full beneficial potential. The latter view added an important twist to the argument, but did not substantively change it. Both views had in common that they did not actually discuss, much less question, what substantive effects technology actually had.

The liberating effects of technology were widely seen as problematic (again) by 1900, especially after 1918. From the late nineteenth century onwards, the substantive discussion of technology was a part of the opening of the restricted liberal order of social practices that I analyze as a first crisis of modernity and an increased awareness of contingency. The technology-related parts of the political-intellectual debates of the time are especially significant since technology is often considered in a double way, as a source of uncertainty and uprooting on the one hand, and as the key to the reestablishment of certainties and the reembedding of social identitites on the other.

A common theme of this discussion was that, given its immense transformative powers, technology could hardly be seen as existentially neutral, not even as neutral in the broader sense of generally enhancing human capabilities. The

individual and collective experiences and interpretations demanded that technology had another, deeper meaning. The degree to which technology was endowed with existential meaning is one major criterion along which views of technology can be distinguished. The other criterion is the question of what one might call the social interlocutor, or addressee, of technology. As some authors put it, technology speaks to human beings, it raises questions and demands. The views vary significantly on the issue to whom it speaks - to individuals, to humankind, or to certain, more or less well-defined collectivities. It is along the lines of these two criteria that I shall map the discursive space of technology appropriation.

Quite a number of the intellectual appropriations of technology endowed it with revelatory and redemptive powers. There can be little doubt that the emergence of such views is related to immense and hitherto unknown transformations of human experience as they were effected by some of the new, or only recently diffused, technologies. The car, the cinema and the telephone restructured experiences of space and time; the big factory, the war and the city provided new senses of human social organization and interaction. These are themes that are taken up in artistic as well as intellectual expression. Still, these technical themes acquire their fundamental significance not really on their own, but in the context of the uncertainties brought about by the broader social transformations of the time. And the general perspective leaves the normative appreciation still open. Authors may write in very similar terms and style whether they are abhorred or positively impressed by the workings of technology. They may praise a new, higher order of human life on the horizon of the future, or may see the end of humankind approaching; in both cases it is technology that provides revelation.

Beyond such evocation of revelatory aspects, impressive as they sometimes are, very few writers appear to have made attempts to analyze the specific features of technology early in the century. Georg Simmel's writings on money and the city could probably be seen as such an attempt. Without dealing with technologies in the material sense of the term, it is, however, Max Weber's theorem of rationalization that provides the foundations for what could be called a "classic modern" view on technology (cf Hård 1995).

This classic modern position tries to deal with technology by focusing on instrumental, procedural aspects only, and avoiding any substantive discussion. Instead of directly relating technology to existential dimensions of human life, it tries to describe what effect it has on human action and on the natural world. What Weber termed rationalization is the extension of control by means of ordering and categorizing forms of human action and by introducing means of surveillance to secure that actual activities would follow these categories. A similar argument could be developed for the ordering, categorization and action on the natural world.

The term rationalization clearly connotes a progressive aspect; I prefer to speak of formalization instead, to avoid this connotation and to stress the means by which this extension of control was achieved. Formalization means the reduction of a

complex social or natural phenomenon by decomposing it into elements which are described such as to make them generic, i.e. to be found in other complex phenomena as well. "Technologies" in a broad sense, including social technologies such as bureaucracy--recompose these elements in such a way that both the elements themselves and their relations are well describable and controllable.

I call this view classic modern because it is a variation of the more general theme saying that modernity provides its own means, does not have to draw on sources external to itself, to order the world. As a reflected position, it seems, this particular variant surfaces only as a response to the criticism of technology and the appropriations of technology as revelation in early-twentieth century. Weber himself is a sober analyst and normatively hesitant; he sees this as the inevitable future, talks even about "progress", but also laments losses. In the rationalist positivism of the Vienna Circle, in the architecture of *Neue Sachlichkeit*/International Style, in the debates on social and economic planning and elsewhere, such classic modernism advances to a strongly propagated normative position, to a twentieth-century version of the ideal of progress, reemerging from a first round of severe criticism. Due to the fervour with which it was proposed during the interwar period, classic modernism even appeared to overcome its very specific deficiency, namely its inability to thematize the alleged "irrationality" of its pure rationality. At that time, it claimed that rationalization as de-substantivization did not really mean the loss of substantive aspects of human existence, but exactly the overcoming of such tradition-bound obstacles to a well-ordered society.

However, such sense of victory for modernism was premature. It kept being challenged on both significant issues, its lack of any answer to the substantive question behind rationalities and its incapability to deal with the experience of technology. The post-Second World War progress in increasing the reach of human action through technical means had repercussions on philosophical as well as political debate. Both Hannah Arendt and Martin Heidegger used the distant look of a human being at the earth, as achieved by voyages into space, as an example to rethink the conditions of human knowledge and action (Arendt 1958; Heidegger 1993: 105; see now Tester 1995). As it turned out, their remarks can now be read as an element of the opening of the debate on postmodernism. More concretely, technological rationalities are being debated as a political topic in environmentalism.

And despite the stunning development of modern technology itself, modernist theorizing remained equally incapable of grasping the fascination with the experience of technology. In the institutionally consolidated disciplines of the social sciences after the Second World War, most research on technology has adopted a very rationalistic approach. Different perspectives, such as those put forward by Paul Virilio or the more recent works by Bruno Latour, have largely remained indigestable, even though vaguely appealing. It is neither my ambition here, nor at all within my competence, to reconceptualize the sociology of technology. One step into this direction is to move beyond attempts to construct a direct and comprehensive

relation between technology, on the one hand, and humankind or society on the other - such attempts prevailed at the time under study here - and to differentiate rather between different social structures of technology experience and different kinds of technology. Certain elements for such a project can indeed be extracted from the debates early in the century.

Among those writings that stressed the novelty of technology experience and its revelatory character, sometimes the individual aspect was emphasized. The possibility of new experiences allowed deep insights into one's self and into the human condition, broadened and deepened the recognition of oneself. In other works, "collective redemption" was in the focus of interest; the collectivity often being substantively defined as the nation or as the working class. Significantly, the former view prevails in aesthetic, psychological and philosophical debate, the latter in sociopolitical texts.

And, typically, car and plane were technical examples for a reasoning of the first kind; the factory for the second. Futurism as a movement occupies a peculiar double position full of tensions between individualism and collectivism, which have its doubtful intellectual solution in *italianità* as a national orientation valueing individual self-realization. And the city - as well as, to some extent, war - has a similarly double position among the technical examples, being evoked both for the anonymous hectics of dense collective life and for the freedom of the individual from imposed social ties and norms.

From this point, we shall return to the sociopolitical issue of intellectual appropriation of technology. We may be said to have reconstructed three main positions: individual redemption, classic modern de-substantivization and collective redemption. They were all proposed against the background of full inclusion of all members of a society into modernity, often known as mass society. Thus, they all dealt somehow with the abdication of the liberal idea of the citizen and thematized, even if sometimes rather implicitly, the relationship of individual and society.

Individual redemptionism, unless it remained content with the enhancement of individual self-realization, tended to develop a "new man" theory, according to which energetic, creative persons would emerge who would lead society into new directions with the help of new technical means. Collective redemptionism held that the new technologies would forge strong collectivities which would together realize humankind's strivings. Jünger, for instance, found national-revolutionary followers who praised the building of the workers' state in the Soviet Union. Classic modernism developed a sort of conveyor-belt concept according to which technical and organizational elites would detect means of rationalization that would be to the immediate benefit of the followers as well as recognized as such. These views on technology were part of a profound restructuration of political debate around the First World War.

## 8. The First World War as a Divide in History

As a young man, Jünger fought in the First World War, and turned this experience of man thrown into a technological hell into a widely read war time memoir. The futurists had praised the coming war already before 1914, and they "perceived, accepted and supported the immission of individuals into the reign of the machine [during the war] as necessary and indispensable for the test of technology" (Nazzaro 1987: 77).

In a number of respects, the First World War can be analyzed as a crucial period for the reorientation of intellectual work as well as, obviously, for political struggle. As we have seen, some observers regarded the war as the first large-scale application of advanced technology and, thus, as the inauguration of a new relation between man and technology. At the same time, the experience of war-time social and economic organization was often interpreted as showing the possibility and superiority of collective arrangements of organized co-operation, at least inside nations. This superiority stemmed from two distinct elements. First, the planned coordination of the war-time economy appeared more efficient than the rules of the market. Second, the cooperation between employers and workers' unions, supported and enforced by the state, seemed to point a way out of antagonistic class struggle. The occurrence of the war itself, furthermore, was regarded as the outcome of unfettered and unregulated workings of liberal-capitalist rules. The profit-driven development of the economy and of technology would lead people, classes and nations into disastrous and violent competition and antagonism.

For all of these reasons, the experience of war - and, importantly, of the Russian Revolution, itself not least a product of the war - reshaped the debates on a needed transformation of liberal capitalism that had been going on since at least the 1890s. It spelt the - temporary - disappearance of liberalism as the organizer and focus of discourse. Generally, it strengthened the "collectivist" position in these debates, i.e. the view-point that the "autonomous" development of economy and technology had to be regulated and controlled in the name of some higher-order reason and by some collective actor. What this higher-order reason should be ("common weal", "solidarity", "fate of the nation," existential features of "humanity", etc.) and who and what the actor or arrangements could be (the state, corporate arrangements, the working class, intellectuals, engineers and technocrats) differed widely with political stand-points but also, significantly, between nations.

Indeed, to obtain a synthetic view of interwar politico-intellectual developments, I propose the image of a *divergence of discursive trajectories*. Before the war, as mentioned above, positions were loosely clustered around a conception of political liberalism. Even though the concept was not enthusiastically embraced, a widespread consensus on its inevitability prevailed. This consensus included the rising revisionist wings of socialist parties and their intellectuals as well as many would-be supporters of the persistent Ancien Regimes of the German and Austro-

Hungarian Empires (Mayer 1985), a fact that is telling enough of its evidence. The war and its aftermath liberated the centrifugal elements in this discursive regime. The emerging intellectual diversity is to some extent reflected in the diversity of political regimes that were constructed as responses to the decline of liberalism. Soviet socialism, National Socialism, Swedish people's home and French Popular Front as well as the American New Deal can historically all be considered as varieties of such responses. The Second World War and its aftermath eliminated some of these responses, most notably National Socialism and Italian (but not Spanish) fascism, but also the possibility of socialist regimes in the West. Intellectually, it limited the variation of thinking about technology, too. How did the interim outcome of technology debates, namely the dominance of the classic modern view, come about?

## 9. America as a Threat and as a Solution

A main line in the European debates on technology, as I tried to demonstrate, stressed the high importance of technology for social developments, positively or negatively, and tended to favour a collective approach to this issue, controlling and directing technology, with a view to avoiding the worst of the dangers or realizing all of the promises, depending on the position. Inasmuch as such reorganization was considered as a conscious and planned effort, specific groups of actors were proposed and offered themselves as guiding elite for such a process. Often, such proposals emanated from engineers' circles and were - implicitly or explicitly - linked to ideas of technocracy, of societal steering by a scientific-technical elite (Dierkes *et al.* 1990). More generally, this issue touched the question of political agency in a "mass society", in which conceptions of the responsible individual appeared superseded.

In the continental European context, where the centrality of the state was still relatively unshaken, such debate was almost inevitably focused on the state. The state appeared as a natural addressee and actor when technological regulation was an issue.[5] In much of the European tradition, even though a number of different understandings of the state and its relation to social groups can be identified, the state was not merely seen as an institution the rules of which happened to apply to all individuals, but the comprehensive representative of a unity that was much more than its constituent parts. The inclination towards a collectivist response was further enhanced by the fact that Europeans tended to see their societies as being exposed to technologies which they did not themselves produce, which came from the outside and forced a reaction on them.

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[5] See Herf 1984; Breuer 1992, pp. 104-106 for Germany. The technology debate merged with a broader discussion on the necessity and feasibility of economic planning to replace or complement market mechanisms. A look at research by Matthias von Bergen (in progress, see now 1995) has given me an impression of the hegemony of the planning idea during the 1930s as well as of the variety of conceptions of planning.

The view that the contested technologies mainly came from the USA, and that America was somehow essentially different from Europe, provided some common substantive background to European debates on technology. In a review of interwar attitudes to technologies Overy (1990: 74) goes as far as claiming that "the fears we have described were not American fears." And Antonio Gramsci noted already in the 1920s: "The European reaction to Americanism [...] must be examined attentively. Analysis of it will provide more than one element necessary for understanding the present situation of a series of states of the old continent and the political events of the post-war period." (cited by Maier 1970: 27) A look at "America" as a topic in these debates will help to understand better some European attitudes; at the same time, observations on the American way of dealing with technology will provide some clue to grasping the slowly emerging dominance of the classic modern view.

In all European countries, American technological developments, especially production technologies as developed by Frederick W. Taylor and Henry Ford, were regarded as highly superior to European ones. Often, they were not just seen as a limited technical example to follow but as some sort of a model for economic and social reorganization. They thus provided opportunities for discussing nationally specific paths to reorganization. In Germany, for instance, Friedrich v. Gottl-Ottlilienfeld (1924) praised Henry Ford's "white socialism" as an ethically sound application of "technical reason" to the betterment of society.

In the context of an analysis of appropriations of technology, Taylorism and Fordism are significant in several respects. First, they mark a clear difference between national situations, according to the state of the industrial economy, and thus allow to contextualise ideas about a national way to technology. In the realm of industrial production, many European statements agree on both, a general appreciation of technical advance in the US and the need for national adaptation of those concepts. In 1917, Lysis (1917; this is Eugène Letailleur) demands the national organization of the French productive system around the "idea of a national technique." In 1931, an observer concludes on the changes in French car production by saying that Louis Renault "does not create an imitation of America. But he adapts the machines to the French needs and to our system." (Boulogne 1931, cited by Fridenson 1972: 55). In Italy, Boccioni talks about "the need for us to americanize" to enter into the realm of modernity (Gentile 1988: 114).

Second, Taylor's "scientific work organization" and Ford's production concept as means of formalization and, thus, of control and order through technology, introduce new questions about the relations between social classes, or between elites and followers, into the societies under study here. Early attempts to introduce the Taylor system were often rejected by the workers and countered by strikes, partly successfully, such as with Renault's first attempt (Le Chatelier). However, the view that these techniques could put an end to the zero-sum game of class dispute and form the beginning of a post-bourgeois age, in which scientific rationality would be used to the benefit of all, spread very soon (Maier 1970: 43). If a debate was led on

such terms, then transcendental aspects could be deemphasized. One could work in a modernist big factory without becoming Ernst Jünger's worker and without creating his worker's state. Labour unions and employers gradually moved to such positions in Europe during the interwar period and adopted them almost completely from the 1950s onwards. One aspect of the technology question had thus been transformed into a bargaining situation between major social actors in the context of societywide feasible economic strategies.[6]

The factory, however, provided only one, even if an important one, of the topics of the technology debate. An equally important issue was what might be called the technification of the everyday world. The reference to the US was as widespread here as in the case of Taylorism and Fordism. European, or Europeanized, portraits of America at the time were littered with descriptions of technical wonders, and often enough the point of such descriptions was the emergence of an essentially different, alien form of life.

A few examples may suffice. Under the title *America, the Menace: Scenes from the Life of the Future*, Georges Duhamel characterized the US as "another civilization that is predominantly mechanical" (cited after Mathy 1993: 55). Paul Claudel, writer and then French ambassador to the United States, always remained nostalgic of Europe but he was also impressed by modern techniques - in ways even reminiscent of futurism. In 1928, he described America as "a dynamo inserted between the two poles and the two ends of the continent." And in the same text, we find the following account of technical experiences: "Movements are everywhere and cities are the power-plants which supply it. [...] The car and the cinema are similar in principle. With one, motionless nature is transformed through our own movement in some kind of colourful wind. With the other, we remain seated and inexhaustible masses of ghosts charge into us." Beyond the experience, these techniques transform the human condition essentially: "We are no longer subjected to circumstances, we dominate a text, we walk in the cosmos."[7]

Many European statements on America at the time touch fundamental issues of human existence. Europeans are impressed or shocked by the way Americans handle those issues; sometimes they observe a technical, mechanical distortion of the questions, sometimes they seem to suggest that Americans have abandoned them entirely. In the context of my argument, this European-American difference can be read in other terms. First, it seems obvious that the enablements provided by technology are much less reluctantly embraced in the US. There are less principled objections; and the result is the technical advance as observed by Europeans. Second, there is no evidence that the American producers and users of these technologies

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[6] See Telò (1988: 27) on the "nationalisation of social democracy" during the planning debates of the 1930s.

[7] All quotations from *Conversations dans le Loir-et-Cher*, quoted after Mathy 1993, pp. 87-8. For similar German portraits see Peter Berg 1963; Schwan 1986. Thanks are due to Barbara Schlüter for help with research on views of America.

associate them less with existential feelings and experiences than Europeans (see Jamison 1995), as some of the latter sometimes suspected. Third, despite a debate that was not much less extended than in Europe, Americans were somewhat less obsessed with the need to link the common elaboration of a stand-point on technology to their collective destiny. One might say that transcendental issues, at least some of them, were privatised. They were open and subject to debate, without an enforced need to come to a common conclusion and act accordingly.

Such a situation is not exactly the same as embracing a classic modern view. Indeed, as Jamison shows, a variety of foundational arguments circulated in the American debate. However, deliberation on matters of principle was largely removed from collective debate; and impediments to technical development were reduced in actual practices. The resulting discursive situation may be characterized as the dissolution of the "technology question" into various aspects and elements that could hardly be reassembled to the demand for one principled answer.

Some technologies were indeed to be used collectively, as in work and war, but they and their effects were considered to touch only a part of human existence. They were regarded as functionally necessary and as existentially not too significant. At the same time, everybody was free to endow technological experience with higher meaning. One might embrace it like a new religion or reject it as dangerous to the human fate and mission; but this view was then considered a private move, without collective repercussions, since the collectivity, the polity did not - and did not need to - take any stand. This was a compromise that was temporarily accepted in the US and, after the Second World War, in Europe as well. It formed the background to the immense diffusion and further development of technologies during the past four decades. It avoided the resort to strong solutions, like a Heideggerian or Jüngerian one, but it did so at the cost of repressing salient issues that were bound to reemerge. The technology debates of the past two decades mark such reemergence.


## 10. Conclusion: Technology and Contingency in Long-term Perspective

Even without analyzing the discursive structure of contemporary debates, one conceptual conclusion can be drawn from the technology debate earlier in this century and from its historical outcome. The historical outcome - by which I mean the relative dominance and political persuasiveness of the classic modern view on technology - lends itself to a very clearcut conception of technology and discourses of technology nowadays. Technologies are assessed according to the enablements they provide in terms of the extension of reach and the enhancement of control in human action. And technology discourses are distinguished according to their acceptance of this conceptualization. On the one hand, technological development is seen, and accepted, as both a means and an effect of the functional differentiation of realms of human action. On the other hand, a moralist fundamentalism keeps raising

issues that cannot be handled on modernist terms. Such theorizing has to, and will be, marginalized, though reflective observers do recognize that it will not disappear (van den Daele 1992).

Such counterposition of incompatible theories does nothing but reproduce historical appropriations of technology and, given the way the alternative is constructed, can hardly escape an endorsement of the former perspective. As such, it appears to socially validate a historical outcome; but it is very far from a theoretically sound conceptualization. Or, to put it more strongly, it misses the most important point, which its construction made disappear. It does not recognize that the classic modern view, which promises to de-substantivize matters and to handle technology on purely rationalist and instrumental terms, itself takes a substantive stand, namely the one to exclude considerations of the "human condition" - the conditions and meaning of human and social life - from debate over technology. For an adequate conceptualization of technology it is insufficient merely to note that such considerations might always resurface as explicit issues of debate. Their existence and reemergence touches on the core of "technology" itself. The uses and effects of technology have to do with the transformation of the conditions of human action - on whatever terms: towards predictability or creativity, towards autonomy or control - and are not just means to given ends. But if this is so, then technology needs to be a key issue of social theory, historical analysis and politics, and cannot be contained in a functional frame around which sociopolitical debate moves without entering the core.

There seems to be, to put the issue in other terms, broad agreement in modernist social science that the early-twentieth-century debate on technology was theoretically not very fruitful. The "machines" of that period did not transform society itself into a machine, neither in the Jüngerian sense of a new age, nor in the terms of critical theory as the end of the individual and the ultimate decline of political action. And theoretical reflection may even permit the opinion that more recent technologies, such as artificial intelligence and genetic engineering, will have no such millenarian or apocalyptic effects either. However, technologies have significantly transformed the conditions of human action, and will possibly do so even more in the future: "The most fundamental aspect of our culture," as Bruno Latour (1991: 35) puts it strongly, is that "we live in societies whose social link is laboratory-made objects." A modernist social science which excludes basic theoretical and normative considerations from view will not be able to understand these transformations, and thus not the emergence of technologies and their effects either.

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