Knowledge in the knowledge society

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All human progress is accompanied by the dark shadows where the imagery of disasters is cultivated. As knowledge increases, the corresponding fear of a secret threat lying in ambush right behind that knowledge also grows. We have an increased ability to travel, communicate, understand, and make our opinion heard, but we are increasingly convinced by the suspicion that our power is illusory and drawn to speeches denouncing the repressive measures employed by powerful institutions against helpless individuals. We buy into rhetoric about the way the biggest and most powerful institutions (the state, education, means of communication, or medicine) oppress the individual, represented as a defenseless individual (a citizen, worker, voter, student, patient). Apocalyptic descriptions of contemporary society make it seem normal to imagine helpless victims, manipulated consumers, deceived tourists, confused voters, and ignorant workers. Within this worldview, science and technology are unmasked as accomplices of the powerful or as instruments of a class that exercises new repressions. If these accusations were as true as they are absorbing, we would find ourselves in the paradoxical situation of living in a society where greater overall rationality causes greater political irrationality.

The notion of the knowledge society I am going to describe here is incompatible with the scientific naïveté that believed that both scientific knowledge and our ability to manipulate social reality were unlimited. I do not share the vision—utopian for some and terrifying for others—of the complete rationalization of irrationality, of the disappearance of local identities, of the destruction of other forms of knowledge that could be considered non-scientific or non-traditional.

It is true that there is no social, economic, or cultural reality that is immune to scientific and technical knowledge. But the unprecedented significance of scientific knowledge in contemporary society does not mean that all other attitudes and forms of life are suppressed.

My goal will be to defend an opinion that, while not very pleasing to those who traffic in great expectations—of an optimistic or pessimistic nature—, strikes me as more reasonable than the alternative: namely, the knowledge society allows for more personal freedom than any previous social arrangement. This freedom is, to a large extent, the flipside of the fact that, fortunately or unfortunately, human beings are incapable of doing much good or causing much damage. We place too much trust in science and technology; this is true both for those of us who expect science and technology to solve all problems and for those who blame science and technology for all misfortunes, up to and including mortgages. Life is not easily malleable; it does not adapt as well to technology as its supporters desire or its detractors fear. There are many limits and obstacles when we try to apply science to reality; some of these roadblocks can be overcome, and others, fortunately, do not seem likely to disappear. In fact, the growth and expansion of science is not necessarily accompanied by a reduction in uncertainty, risk, and unpredictability. That is why the basic problem in today's societies is the governability of complex frameworks, which is the most convincing antithesis to the conspiratorially controllable society featured in the new cyber-epic.

1. The Criticism of Technological and Scientific Civilization

In the 1960s, social theorists of very diverse political orientations—from conservatives to neo-Marxists, from Schelsky (1961) to Marcuse [1964]—carried out a relentless criticism of technological and

scientific civilization, denouncing the imminent creation of a culture controlled by science and the dangers of a technological state. The general tone of these criticisms was that instrumental rationality was the starting point of social manipulation and control. Those were propitious times for the creation of dark future scenarios: science seemed to have turned the apocalyptical nightmare of world destruction into a concrete possibility. There were predictions of unstoppably differentiated evolutionary laws, a reduction in the operative ability of individual actors, an inability to elaborate one's own opinion and defend one's identity, a conspiracy of the elites' involving systematically veiled self-interest, a threat to personal autonomy, repressive systems, a breakdown in the private sector, extremely efficient control over every aspect of life, the introduction of ever more numerous and detailed restrictions, increasing regulation, etc.

From that point on, criticism of the growing power of science and technology became routine. Competition for the most accurate epithet assumed an identifiable target group. The most imaginative speeches made use of formulas such as the threat of the imperialism of instrumental reason (Weizenbaum), the danger of an aggressive colonization of the lifeworld (Habermas), or the inevitability of a new Taylorization of the working world (Volpert). This is the context that allowed for the development of ideas such as Bell's thesis (1960) regarding the end of ideologies or Robert Lane's prognosis (1966) that we were at the beginning of a new era in which scientific knowledge would reduce the significance of politics. At the same time, there was discussion of a new type of society; it was denounced as a technic state or a "scientific-technological civilization" (Mumford 1962; Schelsky 1961). Later, with greater subtlety, they were called "registration societies" (Böhme 1984, 15) because the authorities would wield an enormous amount of data about its citizens.

These and other similar analyses from the same time period suffered a mistaken confidence in the practical efficiency of technology and science. Looking back, we can now say that after fifty years of theories about postindustrial societies, we have become more cautious and more skeptical, in regards to both hope and fear. Neither technocratic expectations nor humanist hopes have been fulfilled. Perhaps the observation by Jean Jacques Salomon (1973, 60) is true, and the myth of human progress through scientific progress is laid to rest, paradoxically, by scientific progress itself.

The now clichéd criticism of science deserves some revision, in part because it stems largely from poorly understood science. The social power of science and technology is not a causal determinant of all aspects and phases of human life, as hoped or feared by those who see this as one of modernity's inexorable destinies. This assumption is based on a mistaken understanding of the social power of scientific knowledge; it fails to consider the fact that there are limits on scientific knowledge even in modern societies. Max Weber and Karl Mannheim already pointed out the fact that the capitalist-rationalist process had its limits and was only capable of prevailing under certain circumstances.

The dramatic effects that science has on the lifeworld do not necessarily imply that everyone interiorizes a scientific vision of the world, that common sense is replaced by scientific thought, that political power is exercised in a central and authoritarian manner, that there are no limits for the discovery and implementation of scientific knowledge, or that these discoveries are risk-free. Planning can also lead to an increase in things such as flexibility, alternative actions, non-anticipatable practical consequences, and so on, that do not justify fears of some kind of calculating control.

On the other hand, the concept of technology we are considering here includes some questionable premises. In the first place, it assumes

that, unlike technology, social processes have a type of unlimited elasticity and malleability. This idea is based on the questionable thesis of a radical availability of history that would docilely obey our technical objectives. In the second place, technical development is seen as a self-sustaining autonomous process. But I find it very unlikely that the development of technology will be exclusively propelled by a single, self-referential logic of growth, in other words, by the best or most efficient solution to a concrete problem. It is not the case that technological preferences help improve processes by, for example, deeming one of the possible technological solutions the best and implementing it (Krohn / Rammert 1985). The introduction of new technologies or the rejection of new technological developments is not determined by technological criteria alone. Technology cannot impose itself absolutely when the reasons we prefer a particular technological solution are found in other areas of life; this happens when the decision is based on political, aesthetic, or moral opportunities.

One of the principal assumptions of modern science was that it could act as a replacement for other types of knowledge. Both those in favor and those opposed to modern science and technology shared the conviction that scientific knowledge eliminated any other kind of knowledge (Marcuse [1964]; Schelsky 1965; Bell 1973). They believed that the rationalization of social action would make traditional or irrational beliefs disappear. The first theories of the knowledge society were also marked by the weight of the positivist conception of science. Lane (1966) reflected the optimism of the early 1960s when he expressed his conviction that scientific thought would reduce and replace previous knowledge in its entirety, deeming it inappropriate or even irrational. But this supposed gradual elimination of traditional certainties, identities, ideologies, and expectations is more of a desire or a fear than a reality. Science and

technology also guarantee the survival of existing forms of action; it could even be said, to a certain extent, that they are responsible for the fact that a lot of conventional ways of thinking and acting are not invalidated.

One of the truisms used to criticize the technology and science society is the supposedly unstoppable concentration of power that is revealed by the sophistication of the control wielded over society. In the last analysis, new technologies could strengthen the conditions of the panopticon extolled by Bentham in 1791 as an example of control (Foucault 1977). It is unquestionable that the new information technologies allow much more efficient surveillance than in premodern societies (Giddens 1990, 22). But it is still unclear whether contemporary society will turn toward a perfectly organized authoritarian state or whether that same evolution will establish the possibility of a radical democratization instead. On the one hand, certain technologies can be starting points for alarming developments because, as many people fear, they allow for flawless centralized surveillance. At the same time, this technological development allows for a significant amount of decentralization, local initiatives, and even effective and accessible surveillance of the people in charge of surveillance.

The specific social constraints of a knowledge society are not the same as the constraints analyzed by the traditional theories of power relationships in general and political power specifically. In the traditional concept of power, power is consciously sought out and implemented; responsibilities can be assigned, the usefulness or costs of exercising power are generally clearly shared and calculable. But the starting point of any investigation into the exercise of power in a knowledge society must be the obscuring of the decision centers in our societies, as well as the fact that the type of power afforded by knowledge has changed substantially when compared to the power

that was expected from science and technology at the beginning of the modern era.

In knowledge societies, human action is strongly conditioned by the circumstances that stem from scientific knowledge and technological devices. But at the same time, ways of thinking and acting in that society can be more effectively protected from the influence of science, to the extent that the conditions allowing resistance are decisively improved. Science and technology is becoming more influential at the same time as social action is becoming increasingly contingent and fragile; this does not provide the "rationality" produced by science a definitive triumph over "irrationality."

What most characterizes the knowledge society is the fact that science and technology provide possible action for a growing number of actors, who can even decisively perfect the resistance against homogenized behavior in that society. Science and technology multiply and intensify the possibilities of opposing the evolutions they themselves have unleashed. They not only configure powers that limit possibilities of choice, afford more efficient controls, and solidify existing relationships of dominance and inequality; they can also, thanks to that same knowledge, increase the possibilities for action, influence those who are powerful, demythologize authority figures, and configure new groups and actors. In reference to power, knowledge should not only be considered a means of coercion—as it appears, at least implicitly, in many conceptions of power—but also a possibility of defending against and avoiding power as well as organizing opposition. That is why it is not contradictory to affirm that in knowledge societies there is an increase in stability and constancy that parallels the increase in insecurity and fragility.

The difficulties that oppose the concentration of knowledge lead to the disappearance of a central authority in society. To make use of one of Alain Touraine's (1984) metaphors, we can say that actors, in

the knowledge society, do not focus their attention on a central location but address separate decision centers that form a mosaic rather than a pyramid. In spite of the denouncements of homogenization, today's society no longer has a few influential (or monolithic) political parties, family structures, labor unions, religious communities, ethnic groups, social strata, or classes. We can observe a process of decentralization or relaxation in every one of these types of social organization. The reason for this process must be found in the very nature of the knowledge that was established in the paradigm of understanding contemporary society, the type of power it offers, and the weakness that defines it.

2. Power and Weakness of Knowledge

It is now common for theorists to affirm that in the knowledge society, collective influence and the exercise of power and control are increasingly influenced by knowledge. Knowledge increasingly assumes the function of the classic factors of production, like property, labor, and land. The application of knowledge has replaced the traditional power apparatus as the dominant and preferred means of power for social action. This change forces us to rethink the social organization by examining the characteristics of a knowledge that is not the same as the knowledge studied by classic sociologists. Classic social theories were overly dependent on a rather deterministic conception of social evolution; they had not thought enough about the power and impotence of scientific knowledge.

The knowledge in knowledge societies is fundamentally scattered. The competence conferred by knowledge is so diversified and can so easily be substituted and combined that concrete social distinctions in a knowledge society are less coherent, one-dimensional, and homogenous than the distinctions in an industrial society. Knowledge is more and more accessible, directly or indirectly, to ever larger sectors of the population.

The flexibility of knowledge is also revealed by the fact that its practical applications are less evident, unquestioned, and explicit than in traditional societies. Knowledge is less connected to definitive social structures. The most recent changes in social structure depend on fact that the social construction of knowledge has been modified. I am referring to the growing importance of the (re)interpretation of knowledge and, therefore, the loss of its typical descriptors: safe, trustworthy, definitive, non-controversial, etc. The interpretation and reproduction of knowledge have become decisive social tasks.

For this very reason, scientific progress does not mean that planning, prediction, and political control are facilitated. In specific circumstances, scientific progress goes hand and hand with developments in the opposite direction, along the lines of a growing fragility in society, a greater consciousness of the limits that necessarily accompany all knowledge. The limits I am referring to are of an epistemological nature; they are limits put in place by scientific knowledge itself. The very machinery of science—as Gehlen (1949, 12) observed—coerces scientists. I do not believe the limits of the power of science should be understood as irreducible irrationality, as a lack of erudition among certain social groups, or even as the result of a conscious attempt by science to keep people in the dark in order to secure its own power. The most important thing for understanding the society in which we live would be to discover the cognitive and social qualities that explain why non-scientific knowledge continues to occupy a significant social niche in modern societies.

The supposed dynamic of replacing all forms of non-scientific rationality has been questioned for long time. Durkheim did not accept Comte's view that scientific truths would dismantle mythological expression. Mythological truths are accepted without any proof, while scientific truths must be submitted to a verification

process. That being said, social action is continually under time pressure and cannot wait for social problems to be solved scientifically. The production of scientific knowledge is only possible when the time crunch and the overriding need for action are overcome. Scientific knowledge has generally emerged when there is delay, distance, examination, and an interruption of the constraints of life. Science has even managed to make these restrictions essential for the validation of scientific knowledge. But "life cannot wait" (Durkheim [1912] 1994). Society should work with certain conceptions of itself. The uncertainty within which science works is not appropriate for life itself. As Pierre Bourdieu says, we should assign a logic to practice that raises less severe logical demands than the logic of logic. The peculiarity of practice consists of not allowing theoretical consideration, because the truth of practice consists of blindness regarding its own truth (Bourdieu 1990). In Durkheim's view, the fact that sociologists always have a cultural lag and the delay of scientific development permits the survival of what could be considered mythologies. In societies in which scientific knowledge is dominant, mythological truths do not lose their social function.

The idea of a triumphant march of scientific knowledge and the resulting decline of traditional knowledge implicitly presumes that, strictly speaking, only scientific knowledge progresses while non-scientific knowledge lacks any progressive dynamic. The feebleness of non-scientific knowledge finds its parallel in the assumption that science continually reduces the field of traditional knowledge but does not increase or even enrich it in any way. However, scientific knowledge references other forms of knowledge, especially common sense knowledge, which it cannot replace (Luckmann 1981). Furthermore, science itself is a source of growth and the evolution of non-scientific knowledge (Brzezinski 1970). "While our knowledge continues to grow exponentially, our relevant ignorance does so even

more rapidly. This is the ignorance generated by science" (Ravetz 1987, 100). The progress of scientific knowledge and especially its practical application carry within themselves new unresolved problems, side effects, and risks. From this point of view, scientific discourse produces ignorance, even if it is "certified ignorance."

The expansion of knowledge is not necessarily accompanied by a parallel reduction of non-knowledge and by an improvement in our ability to take it all in. Quite the opposite, the growth of knowledge may very well imply an explosion of confusion, uncertainty, and an inability to foresee future action. Science establishes a plurality of possibilities; but "with each satisfaction, with every bit of knowledge, science produces a series of new questions, a whole new trend of human dissatisfaction" (Richta 1972, 249).

Among the new ignorances, one of those that is most self-evident stems from the unpredictability of initiated movements. Many of the changes that have scientific causes resist, paradoxically, rational control, planning, programming, or foresight. Dangerous, unforeseen consequences and risks that are hard to recognize are now more relevant than in so-called industrial societies. Hermann Lübbe's observation about our collective capacity to anticipate the future is very pertinent: the inaccuracy of predictions has increased more than the amount of knowledge we wield. "In contrast to the present time, all previous presents enjoyed the extraordinary cultural advantage of being able to say things about their future with much more exactitude than we can about our own" (1987, 95). Lübbe is fundamentally referring to technical knowledge in his observations about the relationship between uncertainty and quantities of knowledge. The number of situations that modify structural conditions of life increases proportionally to the amount of available knowledge. The exactness and validity of predictions are not improved by the progress of knowledge; they are reduced. Modern society is increasingly fragile.

This tendency is accentuated even though—or precisely because—our knowledge about nature and society increases. We are confronting the paradox that an increase in knowledge can provide us with better knowledge of its limits. Knowledge is never absolute, and as its scope increases, it stops claiming that it is.

One possible reservation in the face of this panorama of liberating possibilities about the knowledge society consists of appealing to a "tyranny of the experts" (Lieberman 1970). There are those who claim that technology creates its own politics and that its demands serve the interests of the dominant elites (McDermott 1969). This warning deserves to be analyzed because it often rests on an inaccurate vision of the social significance of the growth of the professions based on knowledge. This does not mean, for example, that the difference between scientific knowledge and common sense knowledge is getting larger. Habermas maintains that rationalization progressively weakens the lifeworld and increases the distance between the culture of the experts and the public. But this development is not inevitable. The need for increasing surrender to the experts does not necessarily have to be linked to an impoverishment of daily life or a weakening of the forms and knowledge we cultivate in our lives or a strengthening of the ability to manipulate and control individuals. In addition: ease of access to specialized advice has emancipating consequences for the individual.

The traditional comparison between knowledge and power saw knowledge as something that can be controlled privately, thus limiting its access. Traditional political power includes the possibility of limiting individual freedoms, imposing one's own will against others' resistance, forcing obedience, threating coercion and administrative persecution without excluding the possibility of physical violence. These are not the types of knowledge and power that are specific to knowledge societies. It is not a question of power

passing to other hands, but of modifying the mode and content of power and, therefore, also its methods and reach.

On the other hand, the social control awarded to science presupposes a degree of coherence and a unity of interests that is not observed among technical experts or in speeches that refer to the authority of science. There is an extended image of science as a building founded upon consensus that does not mesh well with the fact that it is a community in which the disagreements about research strategies and the interpretation of results can be quite virulent. Scientific experts do not act as a group, specialized knowledge is not unified, and it does not seem there will be definitive consensus among experts in the future. Instead, the discovery of power and the simultaneous fragility of scientific knowledge ends up weakening the authority of the experts and creating skepticism about the idea that expert opinion is impartial and objective. Experience teaches that "technological controversies have the form of a competition between two plausible interpretations of a situation" (Barnes 1985, 106). Nothing further from the truth than the idea of a group of conspiratorial elites who submit peacefully to the objectivity of procedure and who find consensus in their single common objective against those who are not experts.

The thesis of a new class, of new forms of opposition between classes, of new political and economic conflicts (Galbraith 1967; Larson 1984) is very questionable. Believing it would mean assuming the experts can develop a sufficient coherence of interests, organization, and political solidarity, although that would still not suffice to form a class. The traditional concept of class does not seem to apply when science's expansion into current social relationships bears a particular fragility in the social structure that stands in the way of the formation of monopolies. Against this fiction, we can establish with some certainty that the experts are not

in control of the knowledge society. This is not so much the result of the modesty of the experts or their aversion to power, but simply depends on the matters under consideration. The mobilization and application of these specialties lead to a paradoxical—and probably unintentional—decrease in the probability that this group of experts will assume a dominant social position. To the extent that knowledge means a capacity for action, for doing something, or putting something in motion, the clients of the experts always reduce their dependency to some degree, even if only because they can question the knowledge they received.

Another of the criticisms that collapses when knowledge societies are analyzed is the threat of general homogenization. There is a plurality of local, regional, or national identities that successfully tackle the universal process of homogenization for the same reasons previously cited for doubting that scientific knowledge will replace all other forms of knowledge. But what makes this universal leveling most improbable is the very nature of the knowledge that our societies manage and transmit: its interpretative and contextual character, the diverse possibilities for its application, its flexible availability. As Ralf Dahrendorf emphasizes, the limits of homogenization have to do with the fact that "all cultures have integrated the symbols of modernity into their own tradition; each culture makes those sym bols into part of their life and only their life" (1980, 753). In other words, the extreme conception of homogenization makes the mistake of considering local social contexts as agencies that are exclusively passive in the face of exterior influences. Local situations not only offer resistance; they also have resources to actively "assimilate" imported cultural practices. Cultural practices and products do not determine the exact way they will be used and applied as distinct from the contexts of application.

We have gotten used to thinking of knowledge as an instrument to consolidate existing power relationships, as if scientific progress always supported the most powerful members of society, was easily monopolized by them, and successfully eliminated traditional forms of knowledge. I believe this idea of science as a particularly repressive instrument that favors the powerful is inaccurate. For this reason, one could say that "in the new global Alexandria of computerized information there is no ultimate perceptual security, no ultimate validation of a text back to an original text or authority. It is a culture based on a ceaselessly interpretative notion of knowledge" (Smith 1986, 162). Knowledge is a potential liberator for many individuals and groups. The difficulties and interpretative spaces that accompany knowledge open a series of opportunities for many people (Smith / Wynne 1989). The very necessity that knowledge should always be re-produced and that the actors should appropriate it, afford the possibility—in a manner of speaking—of imprinting a personal stamp on knowledge. The process of appropriation leaves a mark. In the course of the process of appropriation, agents take on new cognitive capabilities, hone those they already possess, and generally deal with knowledge in a more efficient manner. This then affords them the opportunity to develop a greater critical capacity for new knowledge and to discover new possibilities for action. The social distribution of knowledge is not a zero sum game.

3. The Structure of Knowledge Societies

Our conception of the social structure is still strongly connected to the theory of the industrial society. In that society, social hierarchies are built and legitimized through the production process and the consequences of their specific organization. In a very similar fashion, almost all the theorists of the postindustrial society assumed as a starting point that social, economic, and cultural realities would be determined by rationalization and planning and that the instruments

of that control would be concentrated in the hands of state organisms. This thesis implied that it should have been easier to control individual behaviors administratively, subsuming any social movement within administrative protocol.

That being said, to the extent that the work is increasingly carried out by knowledge professions—the most politically active groups in society—the configuration of the political system must necessarily be modified. More importantly, the possibilities of reproducing traditional relationships of dependency will have to be changed. In a knowledge society, the possibilities for action by individuals and small groups of people have been considerably expanded, even though it should not be assumed that this expansion in operative capacity is valid for all levels of action and all actors. But in general terms, these changes lead to a more superficial and volatile state authority. In this sense at least, one can conclude that the growth of knowledge and its progressive social expansion create greater uncertainty and contingency; they do not allow for a more efficient control of central social institutions.

The fragility of social structures increases considerably in knowledge societies. The ability for a society to act upon itself is incomparably greater. But knowledge societies are politically fragile, not because they are liberal democracies—as many conservatives would like to maintain—but because they are knowledge societies. Knowledge societies increase the democratic character of liberal democracies. To the extent that there is an increase in the opportunities many people have to participate effectively, there is a decrease in the state's ability to impose its will. The "resistance" of circumstances has become much more significant, and the exercise of power more balanced than in the industrial societies of yore. The availability of reflexive knowledge reduces the ability of traditional control centers to demand and impose discipline and conformity. There has been a

more than proportional increase in the ability to apply counter-pressure.

Scientific knowledge affords possibilities of action that are continuously growing and shifting. In contrast to the orthodox image of modern societies, we must emphasize the ability social agents have for conquered action, flexibility, heterogeneity, and the changeability of social structures, as well as the possibility that a greater number of individuals or groups can influence and reproduce those structures according to their own criteria. The ability of individuals to act in their own interest has also been strengthened. "Science becomes a component of politics because the scientific way of grasping reality is used to define the interest that political actors articulate and defend" (Haas 1990, 11). The imposition of political interests is largely based on conceptions of society as they are articulated by science. But we should not forget that a politics that rests on scientific knowledge can also be a politics of opposition and resistance. Given that modern scientific speech does not enjoy a monolithic position, it becomes a resource of political action for individuals, groups, and organizations that are pursuing very diverse interests and goals. Science is not only a harmonizing instrument, quieting conflicts and moderating tensions. Knowledge increases the range of actions that can be pursued by everyone, not only by the powerful.

In the majority of the analyses by social critics, it is assumed that modern society is a unit of civilization that tends toward homogenization of all aspects of life and forms of expression. Many observations of this type contain a crude determinism precisely because they do not understand that the type of knowledge configured by knowledge societies is not the exact and disciplined knowledge afforded by the positive sciences, but a more malleable

and fragile knowledge from which it is not easy to establish a rigid social organization.

Therefore, the process of modernization should be understood in a less rigid and more flexible manner. Even the concepts of functional differentiation and rationalization of social reality that were seen as the motor of modern societies should give way to more open versions of social evolution. For example, the principle of the fragmentation of society, which leads society to lose its center and configure itself into a series of autonomous subsystems, should be corrected so as to also register movements in the opposite direction. Conceptions of a less deterministic society already discuss the processes of integration and dedifferentiation (Tilly 1984, 48) that can in turn modify the dominant tendency of modern societies toward greater variability, fragility, and contingency of social connections. The idea of a unique evolutionary tendency is therefore very questionable. It is noteworthy that many limits do not act as a barrier; there are now previously unknown possibilities of movement between supposedly impermeable boundaries. The process of modernization should not be understood as a series of strictly predetermined evolutionary states, but as an open, often even reversible, process, the expansion of social action. Modernization would then be a multiple, not a linear, process of extending operative possibilities.

The increase in the social control of knowledge is one of those phenomena that helps modify the status given to knowledge when technological and scientific civilization are being criticized. The very existence of this control is indicative of how the sphere of knowledge is not absolutely autonomous and is susceptible to control from other social realms like law or politics.

At first, science and technology can be easily put to the service of any decision. Science's esoteric character, its inaccessibility for many people, converts the scientific system into a resource that symbolizes

independence and objectivity. That is why science has frequently been hailed as an authority that can be employed for controversial decisions. But a degree of distrust has always accompanied the development of science and technology, even though it does not seem that the future will be any different. A curious coincidence occurs in contemporary society: the loss of fear and respect for authority figures and for governmental regulations is accompanied by a growing concern about the negative effects of technological and scientific progress. When we consider the problems of the environment, the consequences of using certain technological devices, the perception that not all social problems can be rationally controlled or avoided or resolved through planning, it is clear that science and technology no longer enjoy general and unquestioned trust. It seems as if our decrease in fear is being compensated by an increase in concern.

Meanwhile, the social control of both scientific and technological knowledge has increased considerably. In all the developed countries, there are complex rules and a large number of organizations that focus on registering, permitting, verifying, and supervising everything from pharmaceutical products, the use of high risk technologies, research methodologies, patents, or the control of foodstuffs. We are no longer living at a time of a completely autonomous scientific realm that rejected any exterior interventions. The application of scientific knowledge leads to knowledge becoming a part of an external, non-scientific social context. One consequence of this incorporation of scientific knowledge into a context that is external to the scientific system is that the existing control mechanisms influence knowledge. Knowledge cannot be freed from the processes of selectivity of those contexts. That is why the political supervision of knowledge is no longer bemoaned as an intolerable break from scientific norms. To the extent that knowledge

becomes a constitutive component of societies, the production, reproduction, distribution, and fulfillment of knowledge cannot be separated from explicit political discussion and legal regulations. The production and distribution of knowledge have become characteristic issues to be considered when making political and economic decisions.

It is no longer the case in the knowledge society that a few actors control almost everything; instead, a lot of people control relatively small amounts. This knowledge is more available for everyone, which reduces the ability for traditional control measures to impose their will. The possibilities held by the individuals and diverse groups that configure civil society to influence, exercise resistance, and assert themselves have increased more than proportionally. Discovering these possibilities also opens the door to new ways of exercising freedom and the nightmare of subtle manipulation loses its force. The progress achieved by science has been accompanied by a decrease in our faith in science: its ability to impress us is short-lived; it only lasts as long as it takes to banish the ghost that we thought was in the machine until we understood how it worked. Knowledge is knowing how precarious knowledge is, how scattered it is, its easy access, its vulnerability to criticism, its inability to combat the obstinacy of common sense and deep-seated habits; in short: knowledge is knowing that life is not very governable and that the final guarantee of personal liberty is the resistance things have to being managed.

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