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The uncertainties of risk communication in knowledge societies

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ABSTRACT: The discourse on risk carried out in the scientific community for some time now has drawn attention to the fact that the conventional concept of risk based on the product of probability and extent of damage is not applicable to the risks associated with modern technologies (e.g. genetic engineering). This is so because we are dealing with hypothetical dangers for which neither the possible extent of damage nor the probability of the occurrence of accidents may be calculated in any exact sense in advance. In the form of technically and ecologically induced risks uncertainty – in relation to the consequences – has become a basic and contentious problem for modern society as a knowledge society. Decisions with regard to uncertainty can only be made as a part of social of processes or hypothetical situations. Processing uncertainty, ambiguity and unfeasibility is the most distinctive characteristic of future-oriented decision-making and risk communication in knowledge societies.

In this essay, I want to highlight some of the more recent theoretical and empirical developments that have taken place in the social scientific discussion of risks. Such an examination requires (1) reference to the texture of modern society and some of its central features that serve as the social, cultural, political and economic context within which science generally and the communication of risks by scientists are embedded. My perspective is that modern society is best understood as a knowledge society. It is self-evident that science and technology pay a crucial role in the modern life-world. But this not means that we have acquired a well-developed sense of the risks and uncertainties that are associated with knowledge in general and risks in particular. On the contrary, what still prevails is a perspective that treats knowledge in disembodied fashion, systematically overestimates its efficacy and independence of mere human circumstances. (2) I therefore intend to refer to the now emerging understanding in the philosophy and sociology of science of scientific activity and scientific knowledge as a contingent process. Science and scientific knowledge need to be understood not from a disembodied perspective but from one that is cognizant of the social conditions from which it emerges, is communicated and deployed. (3) We will refer is some detail to the state and the status of risk analysis in the social sciences highlighting both some the advances that have been made and the contentious difficulties that remain in estimating and communicating risks in modern society.

1 KNOWLEDGE SOCIETIES

Present-day society may be described as a knowledge society because of the penetration of all its spheres by scientific and technical knowledge. Past theorists of society as well provided designations for the assembly of those attributes of social relations they regarded as constitutive of the specific nature of their particular society. They therefore spoke of "capitalist" or "industrial" society. It is for quite similar reasons that we label the now emerging form of society as a "knowledge" society, since it is increasingly clear that knowledge is the constitutive identity-defining mechanism of modern society and the (re)source of its economic activities (Castells 1996).

The historical emergence of "knowledge societies" does not occur suddenly; it represents not a revolutionary development, but rather a gradual process during which the defining characteristics of society change and new traits emerge (Burton-Jones 1999). Even today, the demise of societies is typically as gradual as was their beginning, even if some social transformations do occur in spectacular leaps. But most major social changes continue to evolve gradually, at an uneven pace, and they become clearly visible

only after the transition is already over. The proximity of our time to significant social, economic and cultural changes, however, makes it highly likely that what is now beginning to come into view is of extraordinary present and future significance.

Until recently, modern society was conceived primarily in terms of property and labor. On the basis of these attributes, individuals and groups were able or constrained to define their membership in society. While the traditional attributes of labor and property certainly have not disappeared entirely, a new principle, "knowledge", has been added which challenges as well as transforms property and labor as the constitutive mechanisms of society.

It is precisely the enhanced social, political and economic significance of science and technology in modern society that calls for an analysis of its knowledge. Knowledge has of course always had a function in social life. That human action is knowledge based might even be regarded as an anthropological constant. Social *groups*, social *situations*, social *interaction* and social *roles* all depend on, and are mediated by, knowledge. Relations among *individuals* are based on knowledge of each other. Power too has frequently been based on knowledge advantages, not merely on physical strength. Societal reproduction, furthermore, is not just physical reproduction but, in the case of humans, always cultural, i.e. reproduction of knowledge.

The knowledge referred to in most theories of modern society, and the groups of individuals that are seen as acquiring influence and control by means of this knowledge, tend to be conceptualized narrowly. This does not mean, however, that such a concept lacks cultural centrality and public or political influence. On the contrary, the narrower notion of knowledge that attributes enormous efficacy to scientific and technical knowledge resonates strongly with the dominant public conception of knowledge and its tasks. This concept of knowledge is a testimonial of the success of the scientific community in installing a particular conception of knowledge as the dominant public concept of knowledge.

There exists, then, a perhaps paradoxical tendency to overestimate the efficacy of "objective" technical-scientific or formal knowledge. In the social sciences, such judgments can be found on all sides of the ideological divide. Conservatives and Liberals alike tend at least in Europe tend to express fears about the repressive potential of science, the extent to which its power natural flows to the already powerful and is deployed to enhance regulation, social control, alienation and rationalization.

Whatever the limitations of this "scientistic" conception of knowledge, its centrality clearly reflects the diminishing role of the nonscientific conception of knowing. Despite growing anti-technological and anti-scientific sentiments and the fears of scientists about such cultural tendencies, everyday life too is increasingly being subjected to decisions and attempts of control linked to scientific knowledge. As van den Daele (1992:548) points out, ecological commitments, for example, appeal strongly to "moral and aesthetic concepts of nature as a source of motivation. However, the pragmatic consequences derived from such commitment are typically based on scientific definition and information: toxicity of chemicals, regenerative energy, functions of the ozonelayer, and so forth."

One of the immediate consequences of the emergence of knowledge societies for the debate on risks is the observation that knowledge societies are social systems in which things do not simply happen but are made to happen. Knowledge societies are increasingly the result of deliberate human intervention and decision-making. In other words, the dependence of modern society and its future is more and more linked to decision-making. And decisions involve risks by decision.

2 KNOWLEDGE ABOUT KNOWLEDGE

Among the reasons for the deficit in our knowledge about knowledge is that scientific discourse developed a kind of natural attitude toward its own knowledge. Over the centuries scientific discourse has generated a self-understanding of its knowledge that is both widely accepted among the public and that tends to systematically overestimate not only the objectivity of its claims but also the *immediate* and unmediated societal relevance of scientific knowledge or, the power of knowledge.

For the purpose of a better comprehension of the social (and economic) role of knowledge, one must first of all arrive at a sociological concept of knowledge. This requires that one distinguish between what is known, the content of knowledge, and knowing. Knowing is a relation to things, persons and facts, but also to rules, laws and programs. Some sort of participation is therefore constitutive for knowing; knowing things, rules, programs, and facts is "appropriating" them in some sense, by including them into our field of orientation and competence. Rather than suggesting that knowledge is something that people have in their possession or are able to obtain with relative ease – a notion that is more appropriate for the term information–knowing is better seen as an activity, as something that individuals do. Therefore, knowing is grosso modo participation in the cultural resources of society.

Knowledge, ideas, and information are most peculiar entities with attributes unlike those of commodities, secrets or, money, for example. If exchanged,

knowledge, ideas or information do enter other domains and yet remain within the domain of their producer. Knowledge is not destroyed in the process of consumption. Knowledge does not have zero-sum qualities. Knowledge is widely available. Unlike secrets, knowledge does not lose its influence when revealed. The apparently unrestricted potential of its availability does not diminish its significance but makes it resistant to private ownership in peculiar and unusual ways.

While it has been understood for some time that the "creation" or production of knowledge is fraught with uncertainties and is difficult to predict and plan, the parallel conviction that its application is without substantial risks and that its acquisition reduces uncertainty has only recently been debunked. Only lately have we learned that knowledge is not merely, as once widely thought, the key and the solution to the mysteries and miseries of the world, but is the becoming of a world. And, despite its reputation, knowledge rarely is uncontested. In science, its contestability is seen as one of its foremost virtues. In practical circumstances, the contentious character of knowledge is often repressed and/or conflicts with the exigencies of social action. The introduction of knowledge into a particular situation (by specific actors) does not necessarily means that it will have definitive consequences, as often thought.

I would like to define knowledge as a *capacity for social action.* In this sense, knowledge is a universal phenomenon, or an anthropological constant. Our choice of terms derives from Francis Bacon's famous observation "scientia est potentia" or as it has often been translated in a somewhat misleading fashion: Knowledge is power. Bacon suggests that knowledge derives its utility from its capacity to set something in motion. The term potentia or *capacity* is employed to describe the power of knowing. Knowledge, as a generalized capacity for action, acquires an "active" role in the course of social action only under circumstances where such action does not follow purely stereotypical patterns or, is strictly regulated in some other fashion (cf. Mannheim, 1929). In knowledge societies, the volume and range of situations that require decisions multiplies immensely.

Science is incapable to offer cognitive certainty. This is to say that scientific discourse has been depragmatized. It cannot offer definitive or even true statements (in the sense of proven causal chains) for practical purposes but only more or less plausible and often contested assumptions, scenarios, and probabilities. Instead of being the source of reliable trustworthy knowledge, in this way science becomes a source of uncertainty. And contrary to what rational scientific theories suggest, this problem cannot be comprehended or remedied by differentiating between "good" or "bad" science (or between pseudo-science and correct, i.e. proper science). After all, who would be capable of doing this under conditions of uncertainty? If these observations about the systemic limits of the power of knowledge are correct, one must transform, as is attempted here, ontological and epistemological questions about knowledge into sociological ones.

The extraordinary importance of scientific and technical knowledge does not primarily derive from its peculiar cultural image that represents it as an essentially uncontested (or, objective, that is, as reality-congruent) body of knowledge claims. The tremendous importance of scientific and technical knowledge in developed societies is related to one unique attribute of such knowledge, namely that it represents *incremental* capacities for social and economic action or an *increase* in the ability of "how-to-do-it" that may be "privately appropriated", if only temporarily.

It seems to me that the notion of knowledge as a capacity for social action has the advantage that it enables one to stress not merely one-sided but multifaceted consequences of knowledge for action. For example, the term capacity for action signals that knowledge may be left unused or, may be employed for irrational ends. The thesis that knowledge is invariably pushed to its limits, or realized and implemented almost without regard for its consequences, constitutes a view, which is quite common among some observers, e.g. those concerned with the nature of technological development or better, technological determinism. However, by assuming such automaticity in the realization of technical and scientific knowledge, the notion that science and technology inherently and inevitably force their own realization in practice fails to give proper recognition to the context of implementation and the extent to which the utilization of knowledge is dependent on situation-specific conditions. In other words, the realization of knowledge in economic or business contexts is embedded in a web of social, legal, economic and political circumstances. That is, the definition of knowledge as a capacity for action indicates strongly that the material realization and implementation of knowledge is generally dependent on specific social and intellectual contexts.

In as much as the realization of knowledge is dependent on the active elaboration of knowledge as a capacity for action within specific social conditions, a first direct and important link between knowledge and power becomes evident: The control of the relevant conditions within which knowledge is utilized requires social power. The larger the scale of the project, for example, the larger the need for social power in order to ensure control over conditions for the realization of knowledge (as a capacity for action).

I will now move to the question of risk research and risk communication given the context just described.

3 REMARKS ON THE STATUS OF RISK RESEARCH

Within the field of risk research it is possible to discern, in addition to the agreement mentioned in our introduction, a number of further broad areas of consensus:

First, vigorous academic debate within the field of risk research yields the conclusion that there is no *objective or disembedded concept of risk*. That is, a definition of risk that is universally accepted and which is distinct from an everyday, common-sense concept of risk. Instead, risk is seen as a social construct which has varying significance and can only be understood with reference to specific social contexts and purposes (Rosa 1998: 27ff).

Second, it is now well understood that risk communication has created a new layer and structure of social conflict within modern society that may exceed in its social and political explosiveness any of the old distributional conflicts of the welfare state. Generally accepted institutionalized forms and techniques of regulation have yet to be established as frame for risk communication in society (Lau 1989; Luhmann 1995).

Third, and significantly, there is a return of fundamental uncertainty in society if it was ever absent from society and the agency given that produces such uncertainty is scientific community. At the same time, the common assumption is that it is science that has come to terms and cope with the uncertainly produced by its knowledge claims (Baumann 1992, Nassehi 1997, Yearly1996: 27ff).

3.1 *Criticism of the formal concept of risk*

Initially, risk research was dominated by the distinction between subjective and objective risk, where subjective risk was the risk perceived by individuals and objective risk was risk exactly determined by science and calculated in accordance with formal principles. The difference between subjective and objective risk was reflected in the debate over the risk formula. The stated goal of this research was to develop a universally valid measure of risk which could be used to compare the most widely varied types of risk. It was hoped that this would make it possible to achieve rational clarification of the acceptability of widely differing risks as a function of their probability and the seriousness of the resulting damage (as an overview see Banse,Bechmann 1998). The core of this approach was the formula taken from the insurance industry which defines risk (R) as the product of probability (P) and the scale of the damage (D). This formula is always applicable where the probability of a disaster can be stated and damage can be uniquely determined in quantitative terms.

The significant component in determining risk is the scale of damage. However, when applying a measure of risk outside the technical field the problem often arises of no quantifiable aspects of damage. As with the concept of probability, there is a long tradition of academic theoretical development, which has passed into the literature as “utility theory”. This approach seeks to pass from individual preference structures to quantitative measures of risk on which the various aspects of utility and damage can be projected. It proved impossible to find a uniform measure for utility and damage, and it was not even possible to do this for damage alone. Even translating the most widely varying damage into monetary terms led to rather arbitrary and highly contestable results Bechman, Coenen, Gloede 1994).

The second component of the risk formula, the calculation of its probability as an event, takes us to the limits of what can objectively be known, as the example of a nuclear reactor core meltdown shows. Until such time as an adequate number of empirical cases are available, we can only adduce subjective probabilities that on closer inspection prove to involve a considerable measure of wishful thinking on the part of the person making the estimate (Japp 2001: 22ff)

The formula $R = P \cdot D$ was supposed to provide a model for rational decisions, as it appeared to offer a possibility of putting different activities and potential damage into relationship with each other. This formalization appeared to represent an opportunity to evaluate different sources of risk in terms of a formal calculation, independent of personal, political or economic interests. The abstraction of qualitative differences along the damage dimension and the removal of history and context from the time dimension through the probability calculation are the price for a generally valid and universal measure of risk for estimating socially-created risks.

The crisis in objective risk assessment began with two insights: first that even in the hard sciences there cannot be any uniform concept of risk, and second that the formula $R = P \cdot D$ borrowed from the language of commerce was not publicly accepted where it involved enormous potential risk from large-scale technological installations (Bonß 1995).

3.2 *On the difference between decision-makers and those affected by risks of decisions*

The transformation of risk elements into formal calculations, as is attempted in every form of risk calculation, carries within it the potential for social and political conflict, as quickly emerged in public debate on the assessment of the consequences and the potential impact of new technologies. Specifically with respect to risks that do not involve individual options for action but entail impacts on third parties, decisions

on risks cannot separate the acceptability of damage to others from the actual formal calculation. This is particularly the case when no clear statement can be made regarding the likely scale of damage. The question of social and environmental compatibility, a normative criterion, is inevitably involved. It is not possible to establish any objective limit below which it is possible to determine whether something is harmful or not. Instead risk assessment and limits represent the result of a dynamic process of debate and disputes in which conflicting interests have to be accommodated. This, however, merely shows the complexity of risk calculation, and behind this façade a fundamental social change appears to be taking place (Perhac Jr. 1998).

With the development and implementation of new technologies and the recognition of an increasing number of irreversible impacts on the environment, a new element of conflict has emerged separating decision-makers and from those affected by these decisions. As explicated by Niklas Luhmann, the difference amounts to the distinction between *risk and danger*. Risks are situations where possible future damage can be attributed to an individual's own decision, while dangers relate to damage and hazards from external sources over which the affected individual has no control whatsoever (see Luhmann [1992] 1993: 22–23). Although today all dangers of a technical or ecological nature are caused by deliberate actions and decisions by knowledgeable agents – this is the essence of the thesis that modern society poses a danger for itself – the technological and ecological dangers are perceived by some as risks and by others as dangers – and people behave accordingly. There are several reasons for this.

1 The costs and benefits attributed and associated with technical and ecological risks in fact may not correlate and do not simultaneously affect the same set of actors. As a result, a cost-benefit calculation no longer supplies relevant information for a decision. Individuals at risk from new technologies, e.g. neighbors of nuclear power stations, inhabitants of certain industrialized regions or nearby residents of major chemical plants, bear disproportionately great burdens while the benefits may be generally distributed or profit but an entirely different segment of the population.
2 There is a basic disjuncture between those causing risks by decisions and those affected by the risks. This is due to the extensive functional differentiation within modern society. As the chains of action and impact have become longer, decisions and the consequences of decisions no longer coincide geographically, temporally or socially.
3 Technical and ecological hazards are *societal* or collective risks. For the individual actor, dangers constitute not unlike social norms external constraints that are imposed rather than voluntarily accepted. Whether ecological risks are caused by the acts of many (such as the destruction of forests) or whether technical risks arise as the result decisions of a few decision-makers, one thing is quite evident: individuals neither desired nor were able to share in the decision-making process under which risks were accepted. Risks are events that occur without the individual's knowledge, assent or direct involvement. Faced by this situation the individual agent only has the choice between moving away from the danger, coming to terms with it – or protesting.

As soon as risky decisions in the fields of ecology or technology are taken, the distinction between decision-maker and affected individual invariably emerges. The decisive difference is that the stratification involved does not discriminate between specific classes and does not create social differences. The distinction between decision-makers and those affected is based on the division of societal function and power. The distinction is institutionalized, in part through the functions of the various subsystems in modern society. This is one of the main reasons why ecological protest movements tend to poorly organized in the long run: they become enmeshed in the web of functional differentiation in society.

The points of view of the two sets of agents are correspondingly distinct: from the point of view of the decision maker, the threat presents itself as a risk, from that of the affected individual as a danger. The decision maker tries to rationalize the decision with the help of calculations, estimates, scenarios etc. The decision-making agents even try to take the view of the affected individual into account by factoring in the question of acceptance and by instituting educational campaigns on the risk. However complex and constrained by situation specific conditions of the decision on possible risks, the decision can never involve seeing the risk as a danger and hence switching to the position of an affected individual (Heidenescher 1998: 86ff).

Conversely, those affected by the decision taken, the bystanders see the consequences of the risky decision invariably as dangers. They see themselves faced by a danger which they cannot control, to which they have to adapt in some way and which they only know is regarded as a risk by the individual responsible for causing it – leaving uncertainty and fear to them as agents.

Technological and ecological hazards generate dissension with respect to a future constituted by different agents as either a risk or as a danger. The fact that uncertainty emerges as a hidden but common denominator and that future state of affair become the shared point of reference for agents on both sides of the divide means that there are no general, rational criteria that can be mobilized resolving this conflict.

4 RISK OF DECISION IN THE CONTEXT OF FRAGILE KNOWLEDGE

If we try to draw some conclusions from what has been said so far, the most striking observation is the lack of robust knowledge in the risk debate. Positive or negative consequences of decisions relating to technologies or ecological changes are associated with great uncertainty, so that ultimately there can be only more or less plausible opinions, scenarios etc. on what to expect in future. Because we sense uncertainty but would prefer to be certain we turn to science. We turn to science with the conviction of its superior rationality and the once unimpaired confidence in the feasibility and manageability of the modern world. However, these convictions are seriously impaired and undermined by the problem of risk, technically, socially and in terms of time.

Knowledge of risk is precariously balanced on the hypothetical approach. Trial and error processes, i.e. stepwise adjustment of technical systems to the needs of concrete situations, are being replaced in many cases by scientifically developed long-term planning and statistical risk analysis which can only make theoretical assumptions about reality.

Practical experience and empirical research are increasingly being replaced by models, scenarios, idealizations. Empirical knowledge is being pushed out by subjective probability calculation. The potential for damage the probability of damage are no longer determined by experience and trial and error, but have to be intellectually anticipated, as tests cannot be made on an adequate scale, observations or experiments cannot be repeated as often as desired or even made at all (Brockman 1995).

In normative terms, science has lost its authority through the conflict between experts. Sophisticated technological products are increasingly accompanied by a socially-relevant syndrome combining mistrust and uncertainty which contains material for political conflict. Every new accident releases the built-up tensions and causes public opinion to explode. Technological risk has become a focus over the past twenty years for social uncertainty and fears. Belief in progress has itself reached its limits and tipped into mistrust of the main institutions of the scientific and technical world (Limoges 1993).

The dethroning of the experts is only one result of this trend, another is apparent in the loss of respect accorded to government decision-making procedures. The decline in reliable knowledge based on the individual's own experience in the face of scientifically generated theoretical knowledge which can be revised at any time threatens the credibility of government decisions. Those authorized under our constitutional norms to make decisions in the name of the general welfare depend on expert committees in forming their opinions; those who have the knowledge to make the decisions are not authorized to make such decisions. The result of this process is the loss of a clearly defined structure of responsibilities which makes it impossible to place responsibility for bad decisions clearly (Saretzki 1997).

In terms of time, scientific and technical progress leads to a backlog of demand for knowledge, compared with actual accumulation of knowledge.

Given the way that technical progress is speeding up, constantly causing changes, decisions all need more time as a result of the increased involvement of different bodies and the need to incorporate more and more complex consequences.

While this time is passing, the data which made a decision necessary are also changing. To get through the decision-making process, it is necessary to ignore this data to a large extent. The decision is made on the basis of hypothetical facts. Marquard regards this as a general feature of our technological culture – the expansion of the hypothetical (Marquard 1986). For the onlooker, this leads to an erosion of trust in the public decision-making systems, as they can see the hypothetical for what it is from the outside and attack it as such – a point of view which the decision-maker is deprived of.

Coping with lack of knowledge is becoming the decisive variable in decision-making. As we cannot know the future it becomes all the more important how this lack of knowledge is dealt with in the public decision-making system. The fact that this situation is still relatively new is clear from the fact that there are still no developed theories for it, let alone techniques or routines emerging which are able to handle these new uncertainties.

A modern risk theory must face the problems of how to organize learning processes in a situation of fundamental uncertainty and how to make decisions under uncertainty in highly-organized social systems. More knowledge will not assure a shift from risk to security. The opposite seems to be the case: "the more we know, the better we know that we do not know, and the more elaborate our risk awareness becomes. They more rationally we calculate and the more complex the calculations become, the more aspects come into view involving uncertainty about the future and thus risk" (Luhmann 1991, 1993).

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