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Social Conflicts about the Definition of Risks: The Role of Science

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There seems to have been a fundamental change in the public agenda of western societies in the last decade. Hazards and safety, risk management and risk acceptance are dominant topics of a public rhetoric which begins to displace traditional political issues (Beck, 1986; Offe, 1986; Luhmann, 1986). This generalized awareness of dangers and hazards turns especially against technological developments and the dynamics of scientific innovation.

Security has, indeed, always been one of the central values of the welfare state (Kaufmann 1973). The criticism of technological risks, however, does not mean individual security against economic dangers. It aims instead at collective dangers which are caused by the scientific and technical civilization. Even if these dangers are not very probable, because of their collective character and their relevance to common welfare, they develop a social dynamic which treats as central the question of who decides on risks that threaten potentially everyone.

The discussion about technological risks has been dominated by the perspective of natural sciences and technology. These debates concentrate on the evidence of the technical causation of damages and on the forecast of destructive developments. However, in the course of the different risk debates – for example, the controversies about nuclear energy and the pollution of air and water – it became clear that scientific and technical definitions of risks are based on premises, values and assumptions which are not scientific findings but cultural constructions. Questions about what has to be regarded as a risk, which aspects of a risk are perceived and investigated, and how the possible dangers are to be valued, can only be answered by reference to cultural norms of acceptability.

The limits on causal analysis also become evident when it is impossible to connect risks and dangers with one or several defined causes. This is typically true for many environmental problems. If risks are only vaguely defined, neither the responsible organizations nor the group of persons potentially damaged can be exactly determined by means of causal analysis. Frequently, where to begin or to stop a causal explanation can be decided only by pragmatic methods. Statements

of causal connection, however, can be used for the distribution of social responsibility. They are results of decisions which are determined as much by social and cultural, as by scientific arguments.

The social aspects of risk definition do not even concern predominantly the controversies between experts. The dissent of scientific experts only reveals that the question of whether a technological risk should be accepted cannot be determined by scientific knowledge alone. As the calculation of potential damages and their statistical probability is more and more opposed by public consciousness, the consensus on risks and on the foundations of their definition is becoming a scarce resource or even a factor of production. Public debates about risks can be regarded as a new type of social conflict, because the mere definition of a risk has important consequences for the management as well as for the population. These conflicts do not surface as direct confrontations but as efforts to influence the public definition of dangers by scientific findings and arguments.

Before trying to characterize the role of science in conflicts about technological risks in more detail, I shall summarize the specific attributes of these new dangers. For reasons of differentiation I will contrast the new risks with two other types of cultural risk definition (Cf. Evers/Nowotny, 1987; Beck, 1986; Ewald, 1986; Douglas/Wildavsky, 1982).

I. Traditional Risks

Traditional risks are voluntarily taken by individuals or groups. The capitalist entrepreneur, the investigator or the physician are taking a professional risk just like the officer or the pilot of an airplane. Bearing a risk of this kind belongs to the ethos of a particular professional group or a social rank. This positively valued consciousness of risk-taking still exists as a part of the normative culture of professionals or of occupational groups. In a trivialized form it can be found as a symbol of a particular life-style or subcultural groups.

Traditional risks can be attributed to individuals and are temporally limited. They are socially normed and stabilize the social boundaries of groups. At the same time, the management and handling of these traditonal risks has always been based on differentiated common-sense knowledge of probabilities, on professional traditions and on personal experience and competence. Risks of this kind are taken to realize particular appreciated values, as, for example, the honour of a class or rank, scientific progress or the supply of economic goods. They are closely connected to the process of group socialization.

In premodern societies all sorts of threats, losses and catastrophes which could not be related to the ethos or the duty of a group were not regarded as risks, but as

general plagues and dangers (Luhmann, 1989). General dangers, according to their anonymous and involuntary character, tend to individualize the persons threatened by them.

II. Industrial Risks

The second type of risk definition shall be called industrial risk. By the process of modernization and the rationalization of economic and professional action the management of risks has been rationalized, too. By means of statistical calculation different risks can be rationally assessed and compared. This first step in the scientification of risk assessment corresponds to the rise of the institution of insurance. The costs of damages and losses now can be socialized, although the risks are decided on individually. The redistribution of the monetary consequences among the community of insurants changes the character of risk perception and risk behaviour fundamentally (Ewald, 1986; Evers/Nowotny, 1987). In the course of modernization risks are separated from their normative context and become factors of economic calculation. As economic factors risks are issues of the collective bargaining between economic interest groups. By this collectivization of individual risks the causal responsibility is disconnected from the monetary compensation guaranteed by the community of insurants.

There are several significant and complex consequences of the emergence of a security society. The traditional interpretations of heroic risk taking become more and more obsolete or are limited to professional or sports activities. Moreover, the values which are endangered by risks, such as life, property and work place, are equalized by compensation. Risks which are calculated statistically cannot stabilize group identities. The transfer of costs from the injured person to the community of insurants means, at the same time, the levelling of cultural differences of risks by the logic of quantitative comparison. The individual responsibility for the consequences of risks is transformed into the economic and rational obligation to be insured against claims for damages and personal losses. In other words, moral risk definitions are replaced by economic utility calculations. The preconditions of this process of rationalization are the ascription of effects to individuals and the possibility of measuring the damages. However, these conditions do not exist in the case of ecological catastrophes.

III. New Technological Risks

The new technological risks are more or less a combination of industrial risks and general dangers to life, which are not conceived as risks. This becomes obvious when we take a look at the main characteristics of the new risks.

Just as they are mostly not accepted voluntarily, new technological risks can motivate mutual support and solidarity beyond existing group boundaries. The new social movements are examples of the diffuse character of such associations which allow only temporary alliances (Raschke, 1987).

Most of the new technological risks can only be calculated with great difficulties. There is legitimate doubt whether statistical risk assessment is an adequate method for evaluating singular catastrophes. Nuclear and biotechnological risks may not be very probable. The scope and complexity of their effects, however, lead to a degree of uncertainty that makes a rational calculation very problematic.

In spite of the fact that the technological risks are not taken voluntarily by society, they are, nevertheless, caused by decisions and actions of individuals. These paradoxical circumstances may be explained by the unintended collective effects of many individual decisions, as in the case of air pollution. Decisive for the perception of dangerous consequences of collective effects is the discovery of these causal relations by science. Aggregate effects, having existed in all periods of history, become societal risks by scientific causal evidence. Only scientific knowledge discovers individual responsibility for global dangers and turns them from fate to option.

The falling apart of risk-taking and exposure to risks is also responsible for the paradox noted above. The owner of a nuclear power station surely runs a certain risk of loosing his investment in the case of an accident. But this risk is out of proportion to the dangers to which the population is exposed. The separation of risk decision and exposure to dangers corresponds to the principle of functional differentiation. Functional differentiation in this sense means that the specific rationality of a subsystem tends to neglect the precarious consequences of a decision for other subsystems.

Above all, the differentiation of responsibility and danger results from the widened range of effects caused by interventions in natural balances which have been so far unknown. Scientific methods which allow operating on natural microprocesses (biotechnology, chemistry, nuclear technology) are producing consequent effects which cannot be traced back to its causal sources without difficulty. In this perspective science and technology produce objective risks which have a new quality compared to industrial risks.

The acceptance of technological risks cannot be justified by the professional ethos or the ideology of a group. This is true at least since the erosion of the

different utopias of social progress. For a long time the idea of a continous scientific and technical progress provided reasons for the acceptance of risks as the "costs of modernization". In the meantime the ethos of modernization and progress has lost much of its suggestive power. The acceptance of risk is no longer recognized as a civil virtue according to which risks are the price for a better social future. I presume that this development can be directly explained by the characteristics of technological dangers.

Since they tend to be potentially universal, the confrontation with these dangers cannot be rewarded any more according to the values of a community or a nation. Likewise, the financial compensation by insurances makes no sense because of the inpredictability of effects. The problems of social attribution give them the status of natural disasters which injure human life under the laws of statistics or fate. As they are, on the other hand, a product of social action they fundamentally threaten the legitimacy of industrial societies. If it is true that the continously modernizing society is the cause of fatal catastrophes, the process of modernization must be regarded as a quasi-natural process which is beyond cultural norms and economic calculations. Risk production and risk acceptance drift apart not only as a result of processes of cultural learning but because of the specific logic of risk definition.

To the extent that the new risks cannot be attributed to particular groups they have an individualizing effect. When dangers to life and health are ascribed to the anonymity of accident, the belonging to social groups in terms of class, occupation, neighbourhood, sex and generation, loses some of its importance. In view of the new technological risks all men are equal, even if this does not actually prove true. The individual tends to feel released from social obligations and value relations. It can be assumed that this process will increase individualizing tendencies, which can be observed in western societies at the present (Beck, 1983).

On the other hand, increasing individualism and its economic consequences will probably influence the perception of risk and intensify a generalized consciousness of dangers. The more the endangering of social identity is experienced by individuals, the more the readiness to identify oneself with objects whose integrity is threatened will rise. It is comparatively unimportant whether these objects of projection are perishing whales or the "sick German forest" (Lau, 1985). It is not an accident that this compassion for nature emerged in a historical period of increased individualization comparatively independent of objective developments.

Whereas traditional risks are well defined and circumscribed, whether by professional knowledge or social conventions, the new risks are in many ways unspecified. For a traditional merchant who plans a precarious trade operation, a physician who is testing an unknown substance, or a general who prepares a battle, profit and loss are definitely circumscribed quantities which are more or less evident. The same is true for the period of time during which they expose

themselves or their group to a risk. Only the outcome of the experiment to which they subject themselves is doubtful. In comparison, the new risks are remarkably undefined. This does not only refer to the nature and extent of potential damages which often remain uncertain. The temporal duration of negative effects, too, seems to be almost unlimited. In most cases traditional risk takers could outline the period of risk. Times of danger could be differentiated from times of relative safety. This temporal limitation does not only facilitate psychic coping strategies, but also allows the social accentuation of risk periods and their separation from everyday time.

The vanishing of this differentiation, which is reinforced by the new technological risks, has far-reaching consequences. It puts the individuals in a situation where they have to act normally under the threat of omnipresent and unlimited dangers. It can be expected that this contradictory demand may lead to a cynical or naive habituation to technological dangers.

IV. New Risks and Societal Conflicts

The deficient and uncertain definition of technological risks in temporal, spatial, social and causal repects gives rise to conflicts which are, in first range, argumentative debates about the social definition and classification of hazards. These struggles for knowledge are motivated by the emotional load connected with global risks. More relevant for a sociological perspective is the fact that there is always a multitude of political, economic and social interests affected by the concrete definition of a risk.

The theme of these disputes only outwardly seems to be the radical avoidance of risks. Behind this manifest content of debates there are hidden conflicts about the distribution of risks and their consequences which cannot be directly set on the public agenda.

There is an analogy between the history of the labour movement and the new social movements. The confrontation between the opponents and the supporters of risk taking has concealed a development which has been going on for some time. As freedom from technological dangers becomes a new utopia, which cannot be realized today, the problem of a just distribution of risks shifts to the centre of discourse. The development of the security state which we are experiencing now shows some parallels to the development of the European welfare state (Evers/Nowotny, 1987). The new social movements turn out to be the major promoters of a successful change in the public agenda from economic inequality to risk distribution and control. At least the realistic part of the environmental movement considers the risk debate as a meliorative effort to

limitate and decrease the risk potential. This reformist strategy more or less leads to the replacement of a logic of prevention by a logic of distribution.

Normally conflicts about risk definitions take place on the level of public discourse. In these debates arguments and scientific information serve as resources in a game played by collective actors. The sphere of public discourse becomes the symbolic battle field of interest groups, even if it is often concealed by the factual, scientific character of the arguments.

An important part of the reality of modern societies is influenced by risk definitions. This concerns a number of elements.

1. The size of the group of threatened persons. According to the definition of a risk, individuals can be differently exposed to danger depending on, for instance, their age, sex or class.
2. The characteristics of the group of risk producers. National interventions can be deduced from scientific results about causal relations. They can also serve for the moral or legal attribution of guilt and fault. Depending on scientific evidence the group of responsibles can consist of many small enterprises or consumers or of one big company.
3. The probability of dangers and catastrophes. The statistical assessment of probabilities influences the profit and loss account of the management and the strategies of policy intervention and of opposing groups. On the one hand, statistical risk assessment may increase the feeling of safety. On the other hand, statistical calculations produce a feeling of uncertainty, as they cannot supply information for the individual case. In this function they may promote a sort of "statistically produced solidarity".
4. The costs of risks. The distribution of the costs of compensation and of prevention is one of the most controversial issues of risk debates. In a more general meaning risk definitions also influence the costs of risk management, of political participation and protest and of scientific research on risks.
5. The chances and benefits resulting from risk taking. The profitability of a technological investment is directly connected with its long-term acceptance and therefore with the scientific definition of its risks.
6. The visibility of damages. The new risks can hardly be perceived by individuals. One can experience them only by knowing. Certain risk definitions, however, allow the physical symbolization of a danger. They determine if these vicarious symbols, such as a nuclear reactor, can serve as meaningful memorials for protest actions. If this is not the case, the symbolic representation of dangers remains in the exclusive sphere of scientific competence.
7. The possibility of individual reactions to a risk. By specific risk definitions possible alternatives of individual reaction are given. The opportunities of removal, of changing everyday behaviour or of protest and political influence depend not only on material conditions, but also very directly on the prevailing cognitive mapping of the problem.

8. The distribution of expertise and competence. Risk definitions decide to a large extent which scientific or technical discipline is regarded as legitimately competent for the assessment of effects, for observation and reporting. Public debates on risks have an influence on the spheres of competence, on the financial support and the power of scientific communities. Scientists can have their own interest in a special version of a risk and that may affect their judgement. For that reason the development of scientific disciplines or communities is influenced at least indirectly by public controversies about dangers.

It is possible that these dimensions of the new conflicts – exposure, power, costs and knowledge – coincide, but in principle they vary independently. It is for this reason that they cannot be represented by a definite structure of conflict, similar to that of capital and labour, and that it is difficult to institutionalize them. The situation gets even more complicated as the new conflict patterns react on the traditional economic conflicts (Heine/Mautz, 1988). For this reason strategic political action becomes more difficult than before for all collective actors.

Strategic success in traditional economic conflicts can be measured by the medium of money. Such a symbolic medium which can indicate definite gains or losses of risk conflicts is not in sight with respect to the new risks. All efforts to establish undisputed standards of risk assessment have been frustrated by the incompatability of the subjective and the statistical assessment of dangers. This makes clear why scientific knowledge and not strikes, votes or political influence is the primary resource of conflict.

V. Science and Public Conflicts About Risks

Scientific knowledge can be used in these conflicts as an instrument of power, because it influences the radius of action of the different collective actors. Such a cognitive power can be understood as a function of the zone of uncertainty which is controlled by scientific information (Crozier/Friedberg, 1979). Uncertainty about the conditions of future action can be increased or reduced by scientific arguments. When a group of activists succeeds in establishing a credible relation between the pollution of sea-water and dying fish, the strategic possibilities of the respective chemical enterprises will be reduced. On the other hand low measured values of radiation can signify more safety for consumers and therefore more alternatives of consumption.

When the individual estimate of dangers is no longer based on personal experience and traditional common sense is losing its value, everyday activities

become dependent on information supplied by science and public media. The reliability and validity of this knowledge can only vaguely be estimated by individual knowledge users. It is for this reason, too, that producers of knowledge about risks get in a situation of competition.

It seems to be obvious that conflicts about risks are changing the relation between scientific knowledge production and the public use of this knowledge in a fundamental way. The conventional model of science utilization is based on the deductive transfer of results to social practice. It is clear that the premises of this concept get problematic under the conditions of public disputes. The more scientific findings and arguments are used as strategic resources the more the idea of a technical and instrumental use of objective and definite scientific results becomes obsolete or even proves to be a social fiction (Lau/Beck, 1989).

Instead, science utilization in public debates follows the logic of collective argumentation and legitimation. Scientific arguments are detached from the interests of their users and develop their own dynamics. Once expressed, scientific arguments will more or less bind political actors to a specific point of view. The more different political groups are involved in the conflict, and the more different stocks of knowledge are made accessible, the more difficult it becomes to strategically select scientific results and to monopolize particular sources of knowledge.

A double conclusion can be drawn from this relative autonomy of public disputes about risks. On the one hand, it is clear that the production of scientific knowledge is losing, to a certain degree, its nimbus of objectivity, of social neutrality and of reliability, which has been decisive for the external reputation of science until now. By the institutionalization of counter-expertise not only is the scientific dissent about facts made public, but it also becomes visible that the methodological basis of scientific research can hardly guarantee the certainty which is expected by the public. Scientific knowledge itself becomes a source of uncertainty. The publicity of criticism of science and the wide-spread awareness of a relativistic and opportunistic use of scientific results are characteristic of a period in which science is partially losing its credibility. Paradoxically, at the same time, the dependence on scientific results is increasing. On the other hand, the participants of collective disputes about risks are becoming co-producers of scientific definitions. By the special logic of argumentation the complex but highly specialized supply of scientific knowledge is selected and transformed according to argumentative necessities and constraints. Scientific information is reformulated and synthesized by the participants with reference to their different interests. Paradoxically the autonomy of the argumentative use of scientific findings grows in the same way as public debates become dependent on science.

It is doubtful if scientific research can be characterized any longer as being free from social interests. By the emerging power of definition of scientific knowledge about risks the anticipated conditions of science utilization are introduced into the process of research as criteria of selection and control. Generally an increased

influence of public policy on science as well as an increased influence of science on society can be observed (Weingart, 1983). This process of interpenetration can only be effective because the division of labour between both spheres has not yet been officially suspended.

The mentioned problems of control, ascription and validity are typical for cognitive confrontations of this kind. These communicative enterprises, however, are producing a reality of danger on which all participants (including science) are finally dependent in different ways.

The predominant role of science in conflicts about risks means, first of all, a devaluation of everyday knowledge. If arguments are to be accepted, they have to refer to relevant scientific knowledge, even if this reference is critical of science. Value-orientated and traditionalistic arguments are more effective if they are related to the causal constructions of science. It is very difficult to condemn, for instance, biotechnology as deviltry without reference to the nature of its fateful consequences (van den Daele, 1988).

In this way risk debates are promoting the process of formal rationalization by which arguments get more systematic, more consistent and more differentiated. But the very dependence on the formal procedures of science offers numerous possibilities of concealing one-sided interests. This may be surprising only if one assumes an objectivistic concept of science (Bonß/Hartmann, 1985). The dismissal of this ideal suggests that applied research of the modern type is mainly oriented by experimental or practical success and not by the aim of gaining theoretical knowledge. The relativistic criticism of science may have important consequences. It offers a basis for legitimating the opportunistic, strategic use of scientific results which we can observe in the case of risk controversies.

The more the institutional boundaries between practical utilization of knowledge and scientific research are abolished and the principles of methodological criticism win recognition in the public the more the field of scientific risk assessment is becoming a playground of actors who try to succeed with their version of risk interpretation. Science is possibly losing its role as an arbitrator of cognitive conflicts and is becoming a supplier of argumentative resources or may even join the game.

VI. Some Typical Strategies of Risk Definition

In the following I shall illustrate the changed role of science by three typical strategies of risk definition.

1) *The redefinition of technologically produced risks as natural dangers.* If it is possible to present a technological risk as a natural threat, the conflict potential is

being neutralized. The risk is virtually excluded from the context of societal responsibility and control and integrated within the sphere of general dangers to life. As its existence is no longer regarded as a result of human decision, the risk cannot produce social conflicts, but only individual or collective efforts of coping. For example, the endangering of a biological species can be explained by the epidemic diffusion of a "natural" virus. Similarly the genetic manipulation of organisms can be interpreted as something "that nature has been doing all the time". The comparison of technically produced radiation with natural radiation dosages has a relativating and appeasing effect. As the acceptance of natural dangers is regarded as normal, the renaturalization of risks gives rise to a feeling of normality and releases the people responsible from legitimation pressure. Typical arguments in this context are evidences of natural causes of a danger and the comparison of a new technological risk with similar facts which can be traced back to natural sources.

As the example of natural radiation dosage shows, those strategies may sometimes be successful. Confronted, however, with a universal suspicion of risk these strategies frequently fail. The ecological paradigm, based on complex causal networks, works against the separation of single causal relations and relates even the most natural event to human interventions. The increased reproduction of a destructive parasite, for instance, can be explained by the extinction of a specific species of birds. The concept of ecological interdependence exposes technological innovations to a principally unlimited suspicion of risk and negative effects which questions the simple contrast of nature and society.

2) *The normative reevaluation of risks.* Another strategy aims at the presentation of a danger as a risk voluntarily taken by a particular group or community. The definition of nuclear war which had been accepted for a long time may be regarded as an example of this strategy. According to the then prevailing doctrine, the risk of a nuclear war was defined as the price which the NATO states had to pay for the defense of western values.

The conflict about nuclear energy may show a similar reference to the ethos of a community. West Germany, for instance, is characterized as an economic community which is poor in natural resources and has to stand up against international competition. According to this argument, it therefore has to take the risk of nuclear energy. The propagation of a normative risk acceptance does not work, however, if the responsibility for a risk and the exposure to a risk are separated. The example of the more traditional hazard of getting AIDS shows which conditions enable the standards of a group to regulate risky behaviour. In the case of AIDS there was a change in behaviour after science had attributed the risk to homosexuals, to the emergence of informal group norms and to an integration of the risk definition into the orientation pattern of the group. In the case of technological dangers group processes like this can be effective only if the risk can be at least partially reduced by individual behaviour.

3) *The individualization of risk.* A third general strategy, the individualization of risk, can be effective in two forms. Firstly, it can be assumed, by the statistical assessment of a low probability and by the calculation of monetary compensation, that the risk can be rationally managed by individuals, even if the preconditions for these calculations do not exist. The cognitive certainty produced by this rationalization is founded on the more or less credible illusion that catastrophic risks can be calculated in terms of individual costs and benefits. The scientific character of risk assessment suggests in these cases that statistical knowledge can be used for the individual orientation of behaviour. Even if a factual catastrophe would go beyond any possibility of compensation, the nimbus of quantitative calculation seems to correspond to a need of cognitive security.

Secondly, risks can be individualized by stressing the individual causation of risks and the responsibility for their consequences. An example for this is the controversy about the "dying of forests" in West Germany (Roqueplo, 1986). Though it can be proved that damages to the forest are due to a highly complex chain of causation, individual motor traffic was singled out as the main cause and the most important field of policy intervention. When risks are defined as caused by individual behaviour, the dangers seem to be preventable by individual decision, even if this is not the case. Sometimes it may be more promising to delegate risk management to individual responsibility than to chose coercive measures. The behaviour to willingly volunteer and the appeal to moral standards will normalize the consciousness of danger and increase its acceptance.

The individualization of collective risks corresponds to personal needs of coping. Even if dangers are anonymous and have world-wide consequences, individual strategies of risk reduction can serve as antidotes against the feeling of helplessness.

These strategies of risk definition can only illustrate some aspects of risk conflicts. Until now, the new field of cognitive politics has been scarcely investigated by the social sciences. If it is true that the horizon of technological hazards and dangers becomes an essential part of the reality of modern societies, the role of science is getting precarious. On the one hand, scientific research contributes directly to the increase in objective risks. On the other hand, it is only because of science that we can become aware of these dangers. I think that it is this double role of science as a producer of objective risks and as a medium of public conflict which transforms modern societies into knowledge societies.

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