

**Reflexive Modernisation and Beyond.  
Knowledge and Value in the Politics of Environment and Technology**

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*Theory, Culture and Society*, 16 (4), 1999, pp. 99-125

Preprint version

The management of the environment and technologies is becoming a more and more pressing issue. People are increasingly aware of its importance, while the problems seem to progressively worsen. Among the obstacles to the development of more extensive and incisive public participation is the fact that technological and environmental questions are often so entangled as to practically exclude lay people from the discussion. At the same time, it seems knowledge and values can no longer be separated. Consequently, expert knowledge is debated with regards to its capacity of finding reliable answers to the problems as well as its traditional, axiologically neutral, *super partes* role.

This crucial knot of technological and environmental policies has been faced in different ways and from different perspectives. This paper largely deals with the work of Robert Dahl and of Silvio Funtowicz and Jerry Ravetz (F&R), whose contributions (Dahl, 1985, 1989; F&R, 1992a, 1992b, 1993, 1994) deserve more sociological attention than that received

up to now, as evidenced by their almost complete absence from recent literature.

Their approaches show some affinities with the Reflexive Modernisation paradigm, the theoretical framework provided by Ulrich Beck (1992a; 1992b; 1994; 1995) and Anthony Giddens (1990; 1991; 1994), which has proved particularly influential in putting forward an original interpretation of the technological crisis. An interpretation clearly different from those, such as the Ecological Modernisation theory (Huber, 1985; Jaenicke, 1985), that assume a further increase in scientific rationality is the appropriate way to deal with 'high-consequence' (Giddens, 1990) risks.

In this article<sup>1</sup> Dahl's and F&R's arguments are examined in some detail. This leads to discussion of some core aspects of environmental and technological issues. Subsequently the theories of Dahl and F&R are compared with other positions that can be found in the current debate. Finally, some hints are drawn for further advancement in theoretical analysis and policy making.

### **1. Dahl: democracy vs. guardianship**

Dahl's premise is that technological and environmental questions raise a classical theme of political theory in a new way - the alternative between democracy and oligarchy, or what he calls 'guardianship'. His discussion is centred on the control of nuclear weapons, as an emblematic case of oligarchic management of important and complex problems. Issues such as radioactive waste, genetic engineering, air pollution, and the reduction of the ozone layer have in common the tremendous importance of their implications. But additionally, these issues are of sufficient complexity that average citizens do not have the technical skills necessary to make informed choices or define the limits within which they can delegate decisions to experts. Moreover, the great uncertainty about the

effects of the technical choices, due to the lack of experimentation and the numerous involved variables, makes the means and the aims closely connected. To be able to decide on the means, experts must take a position on the associated values<sup>2</sup>. For example, in the use of nuclear weapons there are both technical and moral dilemmas. If the goal is deterrence, is it better to establish as a target the missile bases of the enemy or urban areas? Is it better (in its double sense of morally acceptable and strategically advantageous) to threaten and possibly massacre unarmed people to discourage the adversary or to end a war more rapidly?

Thus the idea of guardianship reappears, which can be traced back to Plato. It states that since political competence, which comprises moral capacities (determining the common good and favouring it to one's own interests) and technical capacities (determining the most suitable means to reach the target), is not equally distributed among all citizens, it is therefore appropriate to rely on the competence of a minority.

Is it right then to sacrifice democracy in favour of wisdom? Dahl's answer is negative. However, to challenge the logic of guardianship it is no longer sufficient to follow traditional arguments and say that the moral competence is equally distributed or that technical elite can pursue their own interests instead of the common good. The problem is that practical solutions cannot be separated from value choices. Data are often defective, previsions uncertain, and ontological assumptions lie behind instrumental judgments. That makes it impossible to value different options in a purely rational way. As a consequence, experts can impose their own values. According to Dahl this is a new and decisive gap in the guardianship thesis. Given the equal moral competence of all citizens, it is then necessary to increase their cognitive competence. It is necessary to bring common people, as much as possible, to the same knowledge level as experts. Only in this way will they have the opportunity to express well grounded judgments on the policies being considered as well as the limits within which decisions can be delegated.

How can this result be achieved? A simple increase in citizens' participation, without acquiring the necessary competence, makes the control ineffective<sup>3</sup>. Increasing social learning takes considerable time and results in people with very different levels of knowledge (one cannot become an expert in everything). Dahl suggests what he defines as a 'semi-utopian' solution. First, it aims at enlarging the number of persons politically competent by increasing the accessibility and comprehensibility of information. Secondly, it tries to offer people an opportunity to influence the political agenda and, lastly, to create an informed public opinion representative of all citizens. As regards the first and second points, Dahl's suggestions are not particularly new. He proposes to exploit the potential of communication technologies. Information could be made more readily available. In order to limit manipulation and increase efficacy independent experts, selected in a pluralistic way, could examine what is being communicated (what data, on what problems, and how it is being disseminated). People could express their opinions in real-time, thus influencing the agenda by directly participating in the political debate.

The most original idea concerns the third point. If it is impossible for citizens to gain competence in every technical field, a new type of representative body is needed, which Dahl calls *minipopulus*. It is necessary to create a *minipopulus* (composed of paid persons chosen at random, with limited mandate, trained and assisted by expert committees) for every major category of problems. They would be charged with the evaluation of costs, benefits and compatibility of technical solutions with the principles at stake. Through discussion these groups would define the order of preference of the technically feasible options. In this way, it would be possible to simultaneously reduce the cognitive disparity between experts and lay people, and deal with the link between technical options and value commitments. Citizens would have the authority to democratically establish the 'right' solution to a problem in terms of both moral correctness and technical effectiveness.

## **2. Funtowicz and Ravetz: extended peer communities**

At the centre of F&R's interest is not democracy but science. However, the basic problem is the same of Dahl - the consequences of highly complex questions with regard to policy-making. According to F&R, technological and environmental issues have opened a new phase that, referring back to Kuhn, they call 'post-normal science'. Between traditional and post-normal science there is continuity but also considerable differences. The strategies of problem-solving can vary according to the type of issue, depending on the implied level of uncertainty and the 'decision stakes' (which are defined by the size of the possible consequences and involved parts). In this sense today's technological and environmental dilemmas are clearly different from traditional problems. They are often world-wide and long-term as to their dimension and impact. Even local issues often do not have well-defined space and time limits, and data is often insufficient to make them fully comprehensible. Consequently, models and simulations are unreliable. Science must therefore take into account uncertainty, unpredictability, and incomplete control. The success of scientific methodology decreed its supremacy over other forms of knowledge, and science became crucial for decision-making. However today, according to F&R, the usual way of facing problems shows signs of wear and must be replaced by new approaches open to different forms of knowledge. Moreover, values must be made explicit and no longer excluded from the debate.

The peer communities in applied science and professional consultancy are already wider than those in core science. Firms, clients, lobbies, journalists, and jurists can join the insiders in the debate on a product, a technical solution, or a planning methodology. But when uncertainty and 'decision stakes' are very high the question is different. It is no longer a matter of the usual connection between theoretical and practical judgments (O'Neill, 1993: 117-118), but rather the inversion of

the traditional contrast between hard facts and soft values. Now it is the facts that are soft, questionable, debatable, not definitely and completely verifiable. Uncertainty is no longer technical or methodological but epistemological. Moreover, the conflict of value and of priority among objectives, owing to the extreme importance of the consequences of the choices, is moved to the centre of the technical and scientific as well as the political debate<sup>4</sup>.

Participation may ensure not only a wider and more stable consensus, but also may improve the quality of the decisions (Pellizzoni, 1992). The combination of lay and expert knowledge has not only a political value but also a cognitive one - it can improve knowledge. Local communities, in particular, must participate in the discussion not only in accordance with a democratic principle but because their competence is different from, and not replaceable with, that of the experts. Cultures and ecosystems 'coevolve' (Norgaard, 1994; Munda, 1997); this means that those who have lived in a certain place for years - those who are directly affected by a problem - may be able to catch aspects overlooked by the experts or emphasize them in a way that technicians, in applying their general and abstract competence to the specific case, cannot.

However, taking lay competence into account means accepting an extended concept of relevant data, including anecdotes, informal surveys, subjective perceptions. Materials collected with non-scientific methods and without a scientific 'shape'. The extension of the peer communities implies an extension of relevant facts. Emblematic examples of the new scientific paradigm come from the so-called 'popular epidemiology' (Brown, 1997): episodes of citizen mobilising and collecting 'alternative' information, generally against official reassurances about the effects of toxic substances. According to F&R, another typical case is that of AIDS. Here the peer community includes patient families, welfare institutions, journalists, philosophers, commercial groups, fund raising committees and so on. All these subjects influence the experts' work, by discussing what the problem is and what directions research has to take.

But if extended peer communities and extended relevant facts are necessary so that science can effectively support political decision, how can a fruitful dialogue between experts, politicians and lay people be ensured? F&R do not answer this question, although they attribute a fundamental role to social learning and communication technologies.

### 3. Affinities and differences

Dahl and F&R's account of the consequences of major environmental and technological issues matches that of the Reflexive Modernisation theory. These problems are of a new type because they are extremely complex. They often seem intractable. Different lines of action are linked to different value commitments - decisions cannot be justified only from a technical point of view. The exclusive legitimacy of experts in dealing with these issues is no longer tenable<sup>5</sup>.

For Dahl, the main problem is that decision processes are unfair and undemocratic. F&R, on the other hand, believe that scientific problem-solving activity is inefficient. For Dahl, democratising decision processes implies democratising science - thanks to the *minipopulus*, lay people gain competence and participate in the technical debate. For F&R, democratising science implies democratising decision processes - lay people participate both in the problem discussion and in singling out the related policies. As one can see, this difference is not critical.

More clearly divergent, however, are the interpretations they provide of the linkage between knowledge and value and between science and morals. While recognising that epistemological uncertainty is a core aspect of many 'new' problems, Dahl does not thoroughly analyse its implications on the supposed cognitive supremacy of experts. For him the point is that superior technical competence does not correspond to superior moral competence; for F&R the point is that experts' superiority in technical competence is often fictitious: not only the axiological

comparison but also the cognitive comparison must be developed on a level of parity.

All of them look with favour at the use of communication technologies as a means to enlarge the debate. However, for Dahl the legitimacy to participate originates from citizenship - members of the *minipopulus* are chosen at random among the citizens. For F&R legitimacy originates from involvement - participation must be open, first of all and in principle, to those who are directly affected by a problem (one may suppose that conflicts will develop on what the matter is, who is entitled to participate and who is legitimated to decide on these points).

Moreover, the *minipopulus* can operate at any territorial level of government, but Dahl describes an organism essentially good for dealing with issues involving large communities. In a minor controversy, the random choice of members would not assure the representation of all view points, and the costs of training and assisting the selected persons would hardly be justifiable. The extended peer community model, on the contrary, can be applied to problems of any size.

But how can we reach a decision? Shall we follow a majority or a consensual rule? For Dahl, the preferable solution has to be envisaged not in general terms but only with reference to the most likely circumstances in which decisions will be made (Dahl, 1989). Thus, it remains unclear what kind of rule the *minipopulus* must follow. By contrast, the argument for the extended peer communities points to consensual rule. All people involved in the discussion must arrive at a consensus, because no one can legitimately (morally and cognitively) *represent* others: each individual or each interested group speaks for itself. This reminds one of Habermas' theory of communicative rationality and the deliberative democracy ideal of 'an open and uncoerced discussion of the issue at stake with the aim of arriving at an agreed judgement' (Miller, 1992: 55). Actually, the affinities between extended peer communities and the deliberative democracy conceptual framework are evident.

Unlike Dahl, F&R think that a generalised increase in social learning is important because it facilitates the reciprocal comprehension between experts and lay people, thereby establishing a common cultural ground. This divergence derives from their views of cognitive differentials. Dahl conceives of them in a quantitative sense: as situations of objective advantage and disadvantage to be reduced as much as possible. F&R conceive of them in a qualitative sense: as conflicts between different but equally precious forms of knowledge. As a consequence, the role of lay people is differently conceived. For Dahl, it is a question of getting citizens to take an active part in the technical discussion, consciously evaluating the moral and practical implications of experts' definitions of problems and solutions. For F&R, it is a matter of recognising the equal dignity (cognitive even before axiological and legal) of lay people compared with experts. On certain problems, or aspects of problems, experts are lay people and lay people are experts. It is necessary to give credence to the citizens' competence, placing it on the same level as the technicians' and introducing into the discussion the principles and values of both groups.

Dahl and F&R believe that the axiological differentials raise potential conflicts that must be brought to light and debated, but their respective ways of conceiving the knowledge/value relationship are different. For Dahl, it is important to make people aware of the moral implications of technical choices. For F&R, it is necessary to grant relevance to all the ethical-cognitive perspectives. For Dahl, a lower level of knowledge excludes some subjects from the debate. For F&R, the experts' 'closeness' to the decision-makers excludes the contribution of other subjects. In Dahl's case all axiological perspectives have equal dignity and, therefore, must not be obscured by cognitive differentials. Whereas for F&R, different axiological horizons subtend distinct cognitive horizons and vice versa. Dahl sees an asymmetrical relation among principles, aims and technical solutions while F&R imagine a symmetric one (knowledge and values influence each other). Dahl ascribes the experts' lack of legitimacy

in selecting the 'right' solution to a problem to the fact that they behave as if they represent the values and targets of all people. For F&R the point is that they behave as if they represent the knowledge of all people.

#### 4. Objections to Dahl

Are there weaknesses in Dahl's and F&R's arguments? As regards Dahl, we can start by considering some complaints that come from the Italian political scientist Angelo Panebianco (1987). The first one is that Dahl does not sufficiently distinguish between the pre-modern and modern guardianship: he does not develop what is implied in the fact that today's guardians are bureaucrats and technocrats. However, Dahl is not interested in a historical comparison. He tries to analyse the present situation. And the point for him is not so much that science and technology offer the guardians of today the means of controlling the social world, but rather that society is increasingly conditioned by what happens in the technical and scientific sphere, independently from actual attempts at manipulation.

Moreover, for Panebianco nuclear weapons are not a good example. They belong to foreign politics, where the isolation of the decision-makers from the democratic process is often influenced, if not justified, by the rules of international competition. However, this confirms that the example is actually well chosen: many technological and environmental problems have a supranational dimension, and the difficulties of their oligarchic management have clearly appeared, for example, at the 1992 Earth Summit of Rio de Janeiro.

Panebianco's objections are more convincing where they turn to Dahl's *pars construens*. Compared with the problems raised by Dahl, the proposed solutions seem weak. Panebianco dwells, above all, on the *minipopulus*. The group, initially representative, would no longer be such after a period of involvement in an intense debate, because among its members there would develop the same dynamics prevailing inside any

assembly or committee, with divisions and conflicts easily exploitable by professional politicians. Also weak is the suggestion of assigning to independent experts the role of advisors to the *minipopulus* as they, too, can be manipulated and are as prone to conflict as any other group. To elaborate upon this point, it seems contradictory for Dahl to conceive of a 'neutral' or 'balanced' technical training and advice. In this case, it would also be possible for experts to build 'neutral' or 'balanced' technical solutions to political problems and a citizens' assembly would no longer be necessary.

One can see other objections to the *minipopulus*. For instance, some of the members might not have a personal opinion on the problem at stake and thus might be 'compelled' to make up one. In other words, the assembly can partially be formed by people who draw from their intensive training all their ideas about the issue under discussion. This entails a weak and unsteady comparability between personal values and effects of technical choices, with obvious consequences on the reliability of the final judgment of the *minipopulus*.

Moreover, Dahl is confident that new communication technologies are capable to emphasise the role of public opinion in the selection of policies. But why, one might ask, should communication technocrats be any more reliable and democratic than other technocrats? Actually, the computer-based communication revolution is often seen as an opportunity to enhance the democratic process. Thanks to their potential pervasiveness, ease of access and non-hierarchical structure, computer networks seem able to escape from traditional means of censorship and manipulation, ensuring more transparency in decision making and enhancing participation. In fact, existing community networks partially confirm these theoretical possibilities (Guthrie and Dutton, 1992). However, when forecasting the impact of technology one must bear in mind that there is an enormous amount of possible interactions between technical, social and physical variables. Computer based communications may make it easier to participate, but different lines of social or territorial

discrimination between those included or excluded from the network may arise (Thomas, 1995). They intensify communication exchange, but this does not mean that all messages are relevant and 'clean' (reliable and genuine). The problem of information overload is already a serious one (Quarantelli, 1997), and 'virtual communities' are probably not enough to help the lonely individual weigh the relevance, correctness and accuracy of messages coming from organisations with particular agendas and superior access to the network. New forms of manipulation and control have already appeared (Lyon 1994)<sup>6</sup>. To sum up, by themselves new communication technologies may merely reflect the existing gap of knowledge between experts and non-experts. Formal transparency and openness of technical communication does not prevent its contents from remaining 'black boxes' for the lay citizen.

It is also worth considering that the public agenda develops according to cyclic and mostly unpredictable dynamics (Hilgartner and Bosk, 1988; Jasper, 1988; Ungar, 1992). Therefore, people's requests are not always the best 'compass' for the public debate. The most urgent issues are not necessarily the issues that people want to discuss. And those issues that people are tired of are not necessarily outdated or resolved. To give voice to the public does not automatically lead to an arrangement of the problems according to a 'right' order of relevance.

Furthermore, it is not enough to provide people with complete and comprehensible information. It is also necessary for people to want to be informed and contemplate the information. This is, perhaps, the main point. It is linked both to the cyclicity of the debate and to social learning, rejected by Dahl as a long and unsatisfactory solution to guardianship. Perhaps, a response to the threats to democracy lies not only in the transparency of decisional processes, which could be enhanced by the development of communication technologies and institutional reform, but also in the spreading of culture. For democracy, the education system seems as crucial an institution as the parliament.

There is another objection to Dahl's proposal: If knowledge and value are linked, the technical training of the members will probably entail a change in their value systems and, at the same time, a loss of their 'native' knowledge resources. That is, if some citizens become, to a certain extent 'experts', they no longer represent lay people from either a cognitive or axiological viewpoint. Dahl does not consider this aspect because for him lay people have *less* knowledge than the experts - not *different* knowledge. F&R show that cognitive diversity is a much more tricky issue.

### 5. Objections to Funtowicz and Ravetz

Even more than Dahl's, F&R's argument has greater efficacy in its *pars destruens* since the *pars construens* does not offer any precise indication about what form of institutional organisation extended dialogue should take. What are the consequences of different cultural resources - cognitive, axiological, linguistic (to say nothing of the political and economic ones) - at the disposal of the participants in the discussion? Is it sufficient to allow each individual a formal equality in the access to the debate, in order to enlarge a peer community and facilitate a fruitful dialogue? The existence of different viewpoints can be seen as an asset rather than a hindrance but the more serious and universal an issue is, the more difficult it will probably be to reach an agreement about it. For example, its complexity might make a single problem definition impossible to achieve. Also, at stake will be vast interests and the cognitive and axiological perspectives will probably diverge in proportion to the number of individuals, groups, and communities involved (as become apparent at the 1992 Earth Summit). How is it possible, then, to reach an agreement on what is the best solution for everyone (at least temporarily)?

The expression 'best solution' reminds us again of Habermas. Both F&R and Habermas rely very much on the virtues of dialogue. Public

discussion, if impartially conducted among the participants and open to everyone's reasons, can result in a technically preferable option among those available as it corresponds to the agreed aims and therefore to the assumed axiological order (particularly to the adopted criteria of fairness). A consequence of this point, as discussed earlier, is that unanimity rather than majority rule is (ideally) required.

But is it possible to determine the best solution when there is great uncertainty on the essential aspects of a problem and on the possible consequences of the choices? According to the analysis developed by F&R, the answer seems to be negative. Moreover, what Funtowicz<sup>7</sup> calls a 'nice' solution may be impossible to obtain - at least when by 'nice' we mean that all the involved subjects consider this option better than the others *for the same reasons*. This point will be revisited later.

However, we could still maintain that an answer achieved through dialogue, freely accepted by everyone, is the 'best' one in the deliberative democracy sense - that is, if we look at process, and not product, as the main goal. Unfortunately, the problem is precisely in the process. When an optimal technical solution with regard to the aims established by common discussion does not emerge, the differences of role and status, wealth, power, learning (that Habermas and F&R think may be neutralized through dialogue) will probably reappear. Everyone may be granted equal legitimacy to take part in the discussion and different cognitive and axiological perspectives may all be considered valid. But what happens when, following discussion, these perspectives remain divergent? How can one decide? In the end, those who have more political, economic and cultural power are likely to prevail. Although we can imagine the public debate as a never ending process, in most circumstances some definitive action will be required. Having the opportunity to define, for example, the range of 'pertinent' arguments (Hirschmoeller and Hoppe, 1996: 46) or the most 'appropriate' decision procedure (Miller, 1992: 66), means to be provided with the power to heavily influence the results.

The political aspect of the problem thus shows an importance not inferior to the epistemological one. Can the existing institutions support the weight of a fully open debate? F&R insist, like Dahl and like Habermas, on the enlargement of the sphere of public discussion. But it can be argued that they - like Dahl - exhibit an excessive confidence in communication technologies and do not sufficiently take into account the cyclical nature of public interest, which effectively returns a great part of their authority to those involved regularly in the issues (that is to say the professionals). Furthermore, some of those who are entitled to participate might not want to take part and voice their thoughts (due to lack of interest, opinions, time, capacity to publicly support their arguments or confidence in the tangible results from the debate). As a consequence, only some points of view will be represented. Is it then necessary to take into account the possibly relevant data and insights of those who choose not to participate? If so, how can this be done? Through expensive and time consuming research?

Every model of democracy must deal with people's legitimacy and willingness to participate, but these issues are particularly relevant for deliberative democracy. However, this is only a part of the problem. Deliberative democracy suggests that the outcome depends on, or lies within, the decision process. Thus, in theory, the more the participants, the better the decision. But better in what respect? Some possible responses are: debate makes people better citizens by making them more informed, active, and open to mutual understanding (e.g. Dryzek, 1990); decisions which are the result of an open discussion have more legitimacy (e.g. Miller, 1992); and the deliberation process offers new insights into a problem and its potential solution (e.g. Hisschemoeller and Hoppe, 1996). Each of these still has to be fully explored as to its implications and connections with the others.

Moreover, how is it possible to make sure that the options coming out of the debate will find real implementation? Decision-makers may comply with popular will because they consider it a valid argument, out of respect

of democracy, or because they seek to avoid possible conflicts. But they can also employ all sorts of delaying tactics, without actually implementing what has been decided.

However, the problem is not only what the output of the dialogue can be and how to guarantee control over the subsequent political action. The problem is in the dialogue itself. Experts and the public must understand one another, but the cultural diversity will probably create difficulties that will become greater as the community of peers becomes large and more diversified. In particular, the linguistic and cognitive differences keep the ability to separate experts from non-experts. To avoid this, it is not enough to recognise that the contribution of lay people is of significance. Boudon (1986) defines 'authority effect' as one for which scientific concepts and principles are regarded by the public as 'black boxes'. Their acceptance depends more on the prestige of those who formulate them rather than on the necessary reasoning to pronounce a well-founded judgment. One does not have enough time, money or capacity to acquire an acceptable competence on every subject, as Dahl remarked. Moreover, technical expertise can get credit even when it does not give rise to real confidence, by virtue of its power. For instance, the power to decide if, when, and what information has to be supplied to the people directly affected by a problem (Wynne, 1996). Contrary to O'Neill's opinion (1993: 130), in many circumstances it then seems fully rational for an individual to take authority as an indicator of reliable judgments. There is, therefore, the possibility that the knowledge possessed by the lay individual will be filtered by, or inserted in, the conceptual and narrative frames of the scientific community. This result is independent from the intentional will of experts. Namely, a perverse mechanism might easily be realised. On the one side the scientists, in order to take extended facts into account, must express them in a scientifically acceptable language. On the other side, the same lay people are, so to say, inclined to play on the opponents' field, by adapting their arguments to the scientific style of discourse. Both processes turn the original contents into something different. Moreover, in



case of sharp contrast between scientific and non-scientific arguments, the experts' authority and their superior strength of reasoning, deriving from their theoretical background and structured empirical support, makes it probable that they will easily 'demonstrate' they are right. The extended facts that F&R speak of could, therefore, ultimately look very much like traditional scientific facts.

This problem is not restricted to 'high-consequence' technological issues. For example, the 'inherent localized specificity and untranslability of systems of meaning' and the 'dominatory potential' (Healey, 1993: 239) contained in every language used for discussion have been recognized as serious obstacles to the application of deliberative democracy principles to the planning process.

In short, it is not so simple to get out of the 'cage' of scientific rationalization: because the non-experts cannot easily express themselves, because what they say has little probability to be adequately considered, and because they are inclined to accept principles, concepts and accounts coming from the scientific community. Authority and power are therefore mixed, and a kind of self-censorship can be added to science's usual censorship of extended facts. F&R suggest that an answer to this problem is represented by additional, and more widespread, learning. This, however, can be both useless and harmful. Slight scholastic training does not allow people to truly discuss with experts on a level of parity. On the contrary, it can simply lead them to adopt a professional language and conceptual framework. The result will be more uniformity of axiological and cognitive viewpoints between experts and lay people. The resources coming from the least codified branches of knowledge will be lost.

## 6. Risk and society: the structure of the debate

To sum up, Dahl's and F&R's analysis is more significant than their proposals. The questions raised are more numerous than the suggested

solutions. This obviously invites more investigation. We can go one step further if we put their arguments in the context of the current debate on the risk society, in order to highlight its inner structure. The basic questions are:

- a) What does the understanding of risks depend on?
- b) What is the key resource of risk-related social processes?

Two kinds of responses can be found to the first question.

a1) A 'nature first' response. The way risks are socially understood depends primarily on their physical, 'intrinsic' characteristics.

a2) A 'society first' response, whereby the social construction of risks is important - whether they 'really' exist and how they 'really' are is of secondary importance.

We also find two kinds of responses to the second question.

b1) A 'knowledge first' response. The key resource of risk-related social processes resides in the cognitive sphere. Their specialised knowledge provides experts with the possibility to heavily influence policy-making.

b2) A 'power first' response. Key resources of risk-related social processes are status, wealth and authority. The power imbalance between experts and lay citizens is based on decidedly political variables rather than knowledge differentials. The predominance of experts' knowledge is grounded on their authority and the role they have played for a long time as policy advisors.

Clearly, each response does not exclude the other. Rather, it is a matter of what 'comes first'<sup>8</sup>. However, different responses imply different views about the role of science in late modernity and the experts/lay people relationship. The resulting ideal-typical positions will be exemplified by referring to some recent contributions (Figure 1).

a) *Nature and knowledge first*. Dahl and the Reflexive Modernisation theory have to be placed in the third quadrant. From their viewpoint, not only do risks 'really' exist in physical terms but their nature determines how they are socially defined and the resulting social processes<sup>9</sup>. Their

high complexity enhances the role of those who 'know' and 'understand'. More knowledge implies more power and, consequently, a more central role for science as a social institution, even if this can mean either *more* modernity (Beck, Giddens) or *less* modernity (Dahl). The Reflexive Modernisation reading of the risk society not only maintains that science is the most important institution in shaping the relationship between society and risk, or even the identity construction of people, but also that at the centre of this relationship and identity construction are cognitive or, more specifically, instrumental-rational aspects of human action. We can place Dahl and his theory of technocratic power in a similar position. All of them look at science as the core institution whose changing role is most important to analyse.

However, Dahl disagrees with Beck on the effects of environmental and technological threats. For Beck they are essentially 'democratic'. Even if the exposure to risks is unequally distributed, ultimately no one can escape them. This exposes the 'simple modernity' view of science to public criticism by means of political mobilisation transcending class boundaries. New divisions may emerge, outside and beyond the representative institutions in the nation-state. But this 'sub-political' arena is world-wide and composed of *ad-hoc* coalitions - global communities of individual subjects with nothing in common other than their interest in a particular issue (Beck, 1996). Contrarily, Dahl and other authors (e.g. Dryzek, 1996) stress the anti-democratic implications of new 'high-consequence' risks. They provide some groups with more power than others, and in doing so limit the possibility of public criticism of science. Both Dahl and Beck believe in the central role of science and knowledge-based debate. They both maintain that political reform must result in the challenging of experts' arguments by competent citizens, and express confidence in communication media as a means to empower this new 'technological citizenship' (Beck, 1996: 22). However, for Dahl, democracy cannot be improved, as Beck believes, by means of 'blind' reflexive processes enhancing public debate, but through institutional

design. And while Beck believes in a possible development of the public sphere while recognizing the limits of an issue-oriented and symbol-driven politics, Dahl maintains that ecological democratization needs the strategy of 'making the most of liberal democracy' (Dryzek, 1996: 110).

Dahl also disagrees with Giddens. The process of individualisation and globalisation of late modernity, the self-reliant relationship of the individual to abstract systems are, for the British sociologist, provided with positive and fully modern consequences. They free people from social structures, from boundaries of time and space, and open up a larger role for the individual. They foster the development of a personality capable to handle risks, to discern opportunities, and to build skill in dealing with an unpredictable world. For Dahl, the situation is much less positive, much less modern, much more fearsome. Risk society is likely to be an authoritarian society, with technocrats confronting isolated individuals who are unable to organise a collective criticism of technology. Meanwhile, the increasing demand for coordination in replying to environmental threats has the consequence of enhancing centralised decision-making (which the Ecological Modernisation theory actually calls for).

b) *Nature and power first*. For F&R, too, the social definition of environmental problems depends on their 'intrinsic' nature. But there is a striking contrast between their effects on the cultural system and on the institutional system. While from an institutional point of view the role of science is enhanced, from a cultural point of view it is played down. This is true also from the Reflexive Modernisation perspective, but the transformation of modernity through public criticism of expertise seems more difficult from F&R's standpoint. In this case, the political dimension comes to full light. Science goes on dominating the scene because of the position taken in the decision-making process during 'simple modernisation', the age of its full and unproblematic acceptance<sup>10</sup>. This allows scientific knowledge to continue to prevail over other forms of knowledge in the public discourse and in policy making. Therefore, for

Beck and Giddens as well as Dahl, knowledge comes first because power relations are increasingly dependent on conflicts about cognitive claims; for F&R, it is the normative aspect that comes first, because the confrontation between different knowledge claims is shaped by power relations. Hence, F&R take their place in the first quadrant.

c) *Society and power first*. In the second quadrant we can place those who follow the Cultural Theory approach, but also scholars referring to empirical research. A socio-political version of Cultural Theory is provided by Hajer, who analyses cultural differences in terms of discursive constructions. For him, the political scene is characterised by diverging 'claims about what the problem "really" is' (1996: 256), each one struggling to prevail over the others. Of course, we may consider the Ecological Modernisation and Reflexive Modernisation theories as two of these 'story lines'. Debates on pollution are to be understood as 'debates on the preferred social order' (1996: 256). Since there is no pure language we can use, we must try 'to pit different languages and knowledge (for example expert knowledge versus lay knowledge) against each other' (1996: 259). Of course, from this perspective it is not so important whether risks do 'really' exist and how they 'really' are, but rather how they are constructed and managed in the public sphere. So what comes first are the power relations underlying conflicting definitions of risks.

The same conclusion is drawn by authors who are looking at empirical findings on people's risk awareness. For Lidskog, research shows that 'the role of scientific knowledge and expertise is not given any particular attention' (1996: 38), and that science 'is not so central in the risk consciousness of human beings' (1996: 41). Other aspects seem to play an important role, such as: limited option to move away from hazardous areas; economic incentives; earlier experience of hazards; sense of community or sense of place. Empirical results contradict one of the core claims of the Reflexive Modernisation paradigm, but are partly dependent on its own strong points: the increasing heterogeneity and reflexivity of science and subjects implies openness of interpretation of

reality. On the other hand, many 'intermediary links' between science and people (social movements, media, government bodies, business firms etc.) play an important role not only in transferring and reinforcing the scientific view, but also in modifying it and developing alternative views. There is also a local factor. Values, self-understanding and social/spatial belonging of local communities are important parts of their development of knowledge concerning risks. Local groups may also differ in their interests and understandings, struggling for the imposition of their own risk discourse. Hence, scientific knowledge 'may not self-evidently take precedence over this local and practical knowledge' (Lidskog 1996: 47).

Hajer stresses the role of power struggles hidden behind environmental discourses. Lidskog pays more attention to the ambivalent role of public perspectives on science and technology and their links with non-cognitive aspects of risk consciousness. Both of them underscore the importance of the social construction of risk and the connected normative relations among groups. For F&R, too, power processes play a major role in the institutional positioning of science but Hajer and Lidskog conceive the expert/lay people relationship in partially different terms. For Dahl, Beck and Giddens the conflict between experts and lay individuals regards different levels of knowledge. For F&R it concerns different kinds of knowledge. For Hajer and Lidskog the conflict is only partially connected to knowledge differences - it involves a whole set of social-cultural dimensions. For Dahl, the possession of knowledge gives relevance to values. For F&R, knowledge is a way of expressing values and vice-versa. For Lidskog and Hajer, knowledge and values play a complementary role - they are both components of risk consciousness or of different 'story lines'. How they get mixed up at a certain moment depends on many contingent factors. The role of the cognitive dimension is played down. These differences are linked to the way the source of the understanding of risks is conceived. For F&R, Dahl, Beck and Giddens the intrinsic characteristics of risks come first. For Hajer and Lidskog it is culture which comes first.

d) *Society first and knowledge first*. Brian Wynne is a representative of this position. According to him, the evolution from simple to reflexive modernisation has actually never happened<sup>11</sup> because the public relationship with expertise ‘has always been reflexive, though in a more thoroughly hermeneutical sense than the rational-calculative model of Giddens’ (Wynne, 1996: 50). What the reflexive paradigm describes as a passing from trust to mistrust toward science, or from acceptance to discussion, is reinterpreted as an enduring ambivalent relationship, where dependency often plays a more important role than trust. The cognitive relevance of lay competence and the knowledge/value link are stressed in a very closed way compared to F&R’s account. However, Wynne maintains that risk-related social processes refer to ‘identity risks’ rather than physical risks. These risks are connected to the dependency-producing way in which expert systems operate on people, forcing them to adapt to debatable models of social behaviour and relationships. As a consequence, what happens in the cultural system is first and foremost responsible for the unfair power distribution between experts and lay people.

Moreover, Wynne maintains that uncertainty does not exist on an objective scale from small (risk) to large (ignorance) but that risk, uncertainty, ignorance and indeterminacy are ‘overlaid one on the other, being expressed depending on the scale of the social commitments (“decision stakes”) which are bet on the knowledge being correct’ (1992: 116). Uncertainty and ‘decision-stakes’ cannot be separated: one is the function of the other. ‘Science can define a risk, or uncertainties, only by artificially “freezing” a surrounding context... Indeterminacy is embedded *within* the risk or uncertainty definition, not an extension in scale of the same dimension’ (1992: 116). There is no new class of problems facing society as an effect of technology. Rather, it is the internal evolution of society and science that raises a conflict between the social demand of control of increasingly wide aspects of ‘reality’ and a growing consciousness of the epistemological, technical and social limits to the

possibility of control<sup>12</sup>. Indeterminacy is not a property of scientific knowledge, but of the relationship between scientific knowledge and the social system. Reducing uncertainty means imposing constraints on social behaviour - scientific answers to problems can work, as already stressed, only by making social actors behave in predetermined ways. This implies a definition of who the actors are and what their goals are, and so on. The difference with F&R is then that experts’ predominance does not simply result in a refusal or coercion of what people know and could say on a problem (and indirectly of their value commitments), but in a refusal or coercion of people’s self-understanding. We might use Honneth’s (1995) conceptual framework and say that the experts/lay people relationship is marked by a lack of (and a struggle for) recognition.

This is consistent with the point made earlier that F&R’s argument does not acknowledge that, even by substantially reducing the power differences (that is, with scientists and politicians truly willing to allow lay knowledge to enter an open discussion), cognitive differences will remain a serious obstacle to the extension of peer communities. Science tends to translate into its own terms non-scientific facts and force lay people to accept its own problem framing. This is a part of what Wynne calls ‘identity risks’. Then, both society and knowledge come first. That is, knowledge conflicts cannot be solved by simply working on the political level because the first difficulty resides in the difference between scientific knowledge (theoretical, analytic, universalistic, abstract) and typical lay knowledge (pragmatic, synthetic, issue-oriented, localised). This seems to imply that institutional reform is not sufficient. What is needed is some kind of cultural change. Nevertheless, extended peer reviews could promote this change, as they represent an opportunity for confronting and possibly merging different knowledge styles, values and identity definitions.

To sum up, for Wynne the cultural power of science is crucial; for F&R it is, rather, its political power. Both approaches can be considered ‘hermeneutic’ when compared with the ‘cognitivist’, ‘rational-choice’

perspectives of Beck and Giddens (and to some extent Dahl)<sup>13</sup>, but Wynne is more ‘knowledge-oriented’ while F&R is more ‘power-oriented’. Both Wynne and Cultural Politics underscore the social constructivist aspect of risks, but the former gives the cognitive element of the experts/lay people relationship a much more central role than the latter.

## **7. Reflexive modernisation and beyond**

As we can see from the preceding discussion, much work remains before a stronger theoretical framework can be constructed. It is important not to be biased by the Reflexive Modernisation theory which is useful in illuminating some aspects of the relationship between environment and technology, science and society, but also capable of overshadowing other relevant points. For Dahl, Beck and Giddens the key resource in the experts/lay people relationship is scientific knowledge (the ‘knowledge and nature first’ position is, from this viewpoint, the closest to the Ecological Modernisation theory). But for others it is a matter of whole knowledge systems (Wynne) or power distribution, either in the specific sub-field of science applied to policy (F&R) or in the broader public sphere (Cultural Politics). Moreover, empirical findings show that people can have positive beliefs towards the values, ideals and social benefits of scientific research and simultaneously a marked distrust towards scientists as decision-makers (Topf, 1993). On the other hand, it is not entirely correct to describe the experts/lay persons relationship in terms of external criticism towards science. Internal criticism, of which an example is provided by ‘critical epidemiology’ (Brown, 1997), is playing a major role in modifying the relationship between scientists and citizens, redefining research methodologies and opening them to the lay competence sphere.

Each of the ideal types outlined above poses specific problems. As already stressed, the insistence on a quantitative vision of cognitive differentials and an oversimplified account of the simple-to-late

modernisation transition can be regarded as weaknesses of the ‘knowledge and nature first’ viewpoint. The same can be said of the relativism of the ‘society and power first’ perspective. That we speak of environmental problems does not mean they are essentially linguistic. That our value commitments shape the way we see technological issues does not mean that the inverse does not take place. What is missing, in this perspective, is that the ‘external reality’ is not indefinitely malleable. Facts and values are not ingredients that can be mixed at will, and if scientific and non-scientific forms of knowledge are equal, in that they both offer some form of insight, they are also different precisely due to the kind of insight they provide.

A major difficulty of the ‘nature and power first’ and ‘knowledge and power first’ viewpoints is that, once we accept that there can be different valid accounts of nature and problems, we may be left with only story lines on the table. The hope of building extended peer reviews of issues and solutions rapidly fades. Of course, things are even worse when we recognise that nature does not come first. The confrontation between different knowledge systems may then appear not simply driven by, but essentially as being a power struggle, with no possibilities to reach ‘best’ or ‘nice’ solutions to problems and, indeed, even to evaluate what ‘best’ or ‘nice’ means.

This discussion is not of purely theoretical interest, but has implications on concrete policy-making. Let us consider the example of the Environmental Impact Assessment (EIA), as a typical means of environmental governance. Following Dahl, improving the EIA means giving greater impulse to the citizens’ competent opinion, by inserting new and well-designed institutional bodies in the decision process. Following F&R what is needed, rather, is a relaxation of the bureaucratic aspects of the procedure. It should take up an open shape - the ‘right’ option should not be selected after a technical evaluation restricted to experts but should be agreed upon by the interested groups.

Are negotiations acceptable? This seems not the case in the *minipopulus* conceptual framework. No compromises among the members of such an assembly can be admitted, but only an open confrontation about values and general interests with possible opinion changes. We might talk of negotiation only in the specific meaning referring to democratic bodies. Since voting requires that the original positions consolidate in a limited number of options, people must yield on some non-crucial points. In theory, compromises are more likely under the unanimity rule, since under the majority rule there is no need to 'persuade' all members that one option is better than the others. However, the search for a sufficient number of votes leads probably to similar results in real-life situations. Many members who are not sure of the most technically and morally preferable option, will simply accept one of them, for any sort of reasons.

Nor can we properly talk of negotiation from the extended peer community viewpoint - at least if we look for a general consensus on some option as the best available at the moment. Some elements of negotiation may arise when the extended peer community gets the limited task of reaching an agreement on a solution acceptable to everyone in its practical implementation (as foreseeable at the moment).

All of the authors considered move in the area of what Hajer (1996) defines as 'socialisation of ecology' - while debating ecological questions, they reflect on modernity. An enhanced public discussion should lead to a democratic transformation of society. But the character of the debate is defined as either cognitive, 'mixed' (instrumental/axiological) or fully hermeneutic. Likewise, there are different ideas on how this transformation could be attained: through 'blind' social processes, institutional design, or epistemic pluralisation; by means of a reinforced public participation, an extension of elite competition, or individual learning.

All of the authors also seem to call civil society into question. But what civil society? Is it the whole community, from which individuals are drawn to be involved at the institutional level? Is it a constellation of

groups and cultures struggling to gain a space in the public sphere? Is it a plurality of individuals developing intimate reflexivity about the role of expert systems in their lives? Is it a single-issue aggregation of people, expressing their opinion as consumers or by means of dissenting experts? Everyone feels the 'need to reinvent democracy' (Hajer, 1996: 266). But a detailed proposal for institutional reform is hard to find. Moreover, an enlargement of discussion does not necessarily lead to any concrete political result. Democratisation at the level of civil society may leave the political and administrative system unchanged. As Dryzek remarks, it is possible 'to win debates and lose in power play' (Dryzek, 1996: 121). This suggests that a much more oppositional, rather than consensual, model of civil society should perhaps be developed.

One key-question is: what conditions make the dialogue (inside and between civil society and institutions, science and community, experts and public) possible and productive? The 'extended peer review' concept looks promising, as the rise of interest on deliberative democracy seems to confirm. But it is also an abstract concept. It suggests that people, differing widely in what they know, what they prefer, or how they define a problem, must have the possibility to take part in discussions of issues in which they are directly involved. Habermas' Discourse Ethics can be a possible interpretation of this idea.

It is interesting that, once inserted into this theoretical framework, the extended peer review concept appears incompatible with the positions represented by Dahl, Beck, Giddens and Cultural Politics. According to Beck, policies are chosen in a conflictual public arena where every kind of argument and action can take place. This seems rather distant from the image suggested by the Discourse Ethics - the image of a round table meeting governed by mutual respect, open-mindedness and willingness to forget personal interests. Following Giddens, we find individuals increasingly able to 'bend' expert systems to their own goals. Thus, we can have either an extension of elite competition or a 'strengthening' of the subject, but no proper extended peer communities. Even Dahl's

*minipopulus* is far from being an extended peer community as previously specified. Following scientific training, its members have at least partially lost their original cognitive and axiological competence and, consequently, are no longer truly representative of the citizens-at-large. The actual result is an extended community. But, it is one of experts rather than lay people.

As regards Cultural Politics, the confrontation of story lines in the public sphere is again quite distant from the idea of a fair peer review of different perspectives. What is lacking here is the search for a common viewpoint around which can be found an agreed solution to a problem. One can only hope that a more balanced power distribution will allow each group to obtain interest towards its particular viewpoint, that a circulation of power among social groups will favour a periodical change in the dominant story line.

Should we consider Habermas' theory a good interpretation of the extended peer review concept? Maybe so. From F&R's viewpoint, the accent would be on the political effects of procedural rationality (balancing the power between technocrats and lay people). From Wynne's, the accent would be on its discursive effects (merging scientific and non-scientific languages and knowledge styles). However, there is a problem. The 'strong' version of the theory<sup>14</sup> maintains the possibility of a universal, rational consensus on a certain normative order. According to Habermas, a moral assertion can be rationally demonstrated as valid or invalid. The 'universalising rule' affirms that a norm is valid (that is to say 'fair') when everyone, in order to satisfy the interests of each individual, can freely accept those consequences and side effects that they foresee deriving from a universal accomplishment of the norm (Habermas, 1983).

But many environmental and technological issues require an extension of the peer communities precisely because of their epistemological uncertainty. This feature makes the universalising rule impossible to enforce. In fact, evaluating the primary and side effects of a choice becomes impossible. It becomes questionable deciding what the effects will be, with what probability, and who will be affected. The

answer varies according to axiological orientations - the validity of which, following Habermas, this evaluation should help to ascertain. Habermas says that a policy is fair only if its implementation is equally good for each individual. But one is prevented from reaching an agreement on a policy, deemed desirable to everyone having an interest in the issue, due to the impossibility of stating with reasonable certainty what the output of the implementation will be. Moreover, those having an interest in the issue are often difficult to specify - for example when considering future generations<sup>15</sup>.

On the other hand, a solution not complying with the universalising rule could be acceptable only if reversible. But typical of 'high-consequence' issues is that every course of action has irreversible results. One might then consider a solution legitimate when the debate has produced new insights on the problem (Hirschmoller and Hoppe, 1996). But who is entitled to state when 'new insights' have been produced?

The crucial point is that the 'strong' version of the extended peer review implies that the participants must have the possibility of comparing different solutions to a problem through a cardinal or ordinal measure (likewise for the *minipopulus*, at least under the unanimity rule). This requires that the options (and the underlying values) may be ranked according to a property they all possess or a comparative term. Unfortunately this is impossible for many environmental issues (O'Neill, 1993: 107-109). Actually, the existence of discrete and irreducible alternatives represents a serious problem for deliberative democracy (Miller, 1992: 64). But one must still fully understand the consequences of epistemological uncertainty on deliberation when compared with 'normal' uncertainties and incomparabilities.

Thus, for issues characterised by high levels of uncertainty, there is a serious possibility that procedural rationality cannot produce 'internally' rational solutions, in the sense of a general agreement of all peer reviewers on the *reasons* leading to a choice as the best available at the moment (or even as a 'nice' choice). Rather than looking for theoretical agreements

based on a common definition of principles, concepts and goals, it might be preferable to look for agreements on bounded, practical solutions to bounded, practical problems. Therefore, the extended peer review concept seems to require an 'external' rationality. Peer reviewers can agree on an option, but for different reasons. A mutual understanding among the stakeholders can be reached more easily on practical terms than on the grounds of principle.

Of course, this 'weak' version of the extended peer review concept is far from unproblematic. For instance, the vulnerability of deliberative democracy to manipulation (Miller, 1992) could be worsened by the transition from 'internal' to 'external' rationality. The search for an 'agreed' option rather than the 'best' one may encourage a self-seeking behaviour within the peer community. Thus, the following questions deserve investigation:

a) What are the conditions favouring cooperation and an unselfish attitude within the peer review process? What institutional frameworks can promote it?

b) What are the conditions favouring the stability of choices? When are the actors driven to persistently comply with the obligations undertaken?

In other words, it is necessary to understand how a 'weak' extended peer review model can be distinguished from pure compromise. For example, one might explore whether and how the mutual recognition promoted by the extended peer review process and an increasingly widespread perception of a common destiny (as linked to global threats and supported by such images as the little and defenceless Earth seen from the outer space) lead individual and group behaviour towards cooperation and stability. This seems a fertile ground for research in the years ahead.

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## Notes

1. I am grateful to Silvio Funtowicz and Jerry Ravetz for their invaluable comments to earlier versions of the work. Some discussions with Silvio were particularly useful in clarifying various points. I am indebted with the Editors and an anonymous Referee of TCS for their remarks and suggestions, which allowed me to rethink or develop some parts of the work. I am also indebted to David Thompson, who fastidiously discussed with me almost every single word, trying to understand what I was trying to convey and make more presentable my English. Many thanks also to Bruna De Marchi and Emanuela Fabretti for their helpful feedback.

2. The linkage between goals, means and values is a feature of political issues. However, their potential consequences and the 'exclusiveness' of the implied knowledge makes major technological and environmental problems much less 'tractable' to lay citizens than, say, the organization of the health or taxation systems.

3. To Dahl's argument it may be added that if we look at ecological groups as the most effective means to improve participation, we must bear in mind that the success of environmentalism as political discourse and as 'civil society' organizations tends to separate grassroots movements from organisations governed by restricted groups and to project these last into the technocratic sphere. Hence, to strengthen the role of environmental groups can mean to give space to a sort of elite participation.

4. A typical post-normal science problem is that of climatic change. What steps must be taken to limit the effects of the rise of sea level? The causal chain that can produce this effect is long, complex and very uncertain in its passages, retroactive effects and time sequence. The stakes are very high: submerged towns, great migration, social, political, economic upheavals. Selecting one preventive policy rather than another will have exceptional consequences; yet the decision is based only on scanty and questionable information.

5. Of course several environmental problems can be confronted by 'simple modernity' means, that is by normal science and technological development (Mol and Spaargaren, 1993).

6. According to empirical findings, people show less caution or scepticism towards computer sources of information in comparison with human sources (Waern and Ramberg, 1996). This could have to do with the ease of access to information or with its sheer quantity. Moreover, real-time communication means that an information poor in quality can be disseminated directly, widely and publicly (Quarantelli 1997).

7 Personal communication.

8. None of the authors cited in this article maintains that only the physical aspects of risks are important or that no risk does really exist 'out there'. No one affirms that only power or only knowledge is relevant in shaping social responses to technological and environmental threats. But while some of them say that first of all we have to consider how risks are being shaped inside the natural environment, others observe that what counts is, first of all, how risks are shaped inside the social system. And while some scholars believe that power relations determine or are at least superimposed on knowledge relations, others affirm it is the cognitive relations that determine power relations.

9. In its latest version (1996), Beck's theory seems more sensitive to the 'society first' side of my schema, but in my opinion it still remains grounded on the 'nature first' side. For him, the landmark is still what happens in the real world: present dangers are substantially different from the old ones (p. 4); the event of the destruction of the world can be played down (then it is logically set over) by our talks about it (p. 7); and what is most important is how (really) real become our constructions of reality-in-itself, (p. 10) - the actual effects that actions based on those constructions produce.

10. Silvio Funtowicz (personal communication) notes a central contradiction in the modernisation project. Since its beginnings, science proposed a model where trust had to be progressively replaced by truth. But the search for truth was the specific task of a new elite, the scientists, whom common people had to believe (although in principle they, also, could arrive at the truth). In other words, science as an intellectual project claims it needs no trust, but as a social institution requires trust

just like any other. Perhaps this contradiction can help to explain why someone looks at the increasing demand of trust by expert systems as an expression of more modernity or of less modernity.

11. Against the Reflexive Modernisation theory evolutionary model see also Alexander (1996) and, indirectly, Luhmann (1993), who notes that people do not always adopt the 'risk conscious' behaviour which Giddens claims is typically modern.

12. According to this account, F&R's concept of 'extended facts' should be referred to the 'discovery' of previously not acknowledged scientific facts, rather than to the acceptance of non-scientific knowledge. However these seem to me essentially different ways of describing a same process.

13. For example, both Giddens and Wynne underscore the relevance of the effects of expert systems on identity. But they see these effects as provided either with a liberating or a constraining power. This is a consequence of the different identity concept they use: Giddens a strategic-instrumental one; Wynne a hermeneutic one (rational choice plus value commitments plus emotional aspects such as sense of belonging to community and place, etc.). As regards Dahl, the 'rational choice' element of his argument is the way he conceives the decision process inside the *minipopulus*. Given an arrangement of moral assumptions and goals, what is needed is simply to be provided with the cognitive means necessary to ascertain what solution can better implement them.

14. I am referring to the original (and most influential) version of the Discourse Ethics. In his most recent writings, Habermas (1992) introduced a distinction between moral and ethical questions. Now he maintains that the universalizing rule is applicable only to moral issues. Ethical issues may raise a conflict between interests and positions so different that it is impossible to find a generalizable point of view. Therefore, only fair compromises can be achieved. Clearly, the distinction between moral and ethical questions and the assignation of an issue to the one or the other category (according to Habermas, environmental problems entail ethical questions) raise several difficulties. However, there is no room here to discuss this

point or debate whether the later version of the Discourse Ethics represents an approach to what I call the 'weak' version of the extended peer review argument.

15. Moreover, indeterminacy makes insignificant the avoidance of performative contradictions in the discourse. After having recognized someone (an individual, a group, every human being, animals, vegetables) as my interlocutor, I can avoid contradicting myself only if I justify my solution to a problem by showing that it respects also his/her/its own interests. But in those cases in which it seems impossible to state with reasonable certainty how one could achieve this result, such demonstration is reduced to a mere linguistic exercise.