

CREATING PUBLIC ALIENATION: Expert Cultures of Risk and Ethics on GMOs

BRIAN WYNNE

■ INTRODUCTION

Public concerns about new technologies like genetically modified organisms (GMOs) have occasioned recognition of a crisis of public confidence in science in late-modern society (UK House of Lords, 2000; CEC, 2000). The long-held belief on the part of promoters of such technologies that the public's unwillingness to comply with scientific prescriptions is due to public ignorance and media irresponsibility, has been falsified by copious evidence and experience (which is not to say that these conditions do not exist). Nevertheless, the key insight continues to be systematically overlooked—namely, that sceptical public reactions are not reactions to (supposedly misperceived) risks as such, or to media representations of these, but rather are public judgements of dominant scientific and policy institutions and their behaviours, including their representations of the public (Wynne, 1980, 1989).

This alternative understanding of the basic forces and responsibilities underlying public responses recognizes that they have intellectual substance, which of course is always fallible and arguable, yet their intellectual substance does not correspond with institutional expert categories, since it goes much deeper than simply 'disagreeing with' or 'rejecting' expert views. Conventional approaches, on the other hand, reproduce long-standing, deeply cultural presumptions of a categorical divide between factual, objective and real knowledge on the one hand, and cognitively empty emotion or values on the other; and that whilst science looks after the former, lay publics are only capable of taking sentimental, emotional and intellectually vacuous positions.

Address correspondence to: Professor Brian Wynne, CSEC, Lancaster University, Lancaster LA1, UK;
E-mail: B.Wynne@Lancaster.ac.uk

According to this modern cultural worldview therefore, insofar as the lay public does get on proper terms with rational scientific views, this results from recognizing its proper dependency on science, and granting it appropriate trust. This fundamentally misconceived approach is expressed in the assertion that 'trust is a functional substitute for knowledge', according to a team of leading social scientists of biotechnology risk perceptions (BEPCAG, 1997). This would suggest that trust or mistrust is not even an issue when adequate knowledge prevails, so mistrust and opposition must be founded on ignorance.

In this essay I analyse dominant characterizations of public concerns about GMOs, especially the relatively new domain of ethical concerns, which form a recent and growing agenda through which public responses are recognized, constructed and expressed. A rash of reports (some of which are analysed later) and official committees dealing with ethical dimensions of genetic technologies testify to this new focus, and to a corresponding shift in the balance of apparent authority between risk assessment science and public perceptions largely represented through ethical experts. These dominant discourses of ethical concerns and of the public categorically distinguish between risk concerns on the one hand, and ethical concerns on the other. Indeed, some of these have admonished policy experts for misreading public concern about GMOs as risk-based when these are primarily ethical, according to their research (e.g. BEPCAG, 1997). In this way public concerns are apparently given greater autonomous policy weight, by defining them as ethical rather than as risk-focussed, and thus not subordinate to correct scientific understandings in the way that risk concerns are assumed to be.

This categorical risk-ethics classificatory divide has greater, as-yet unseen implications which should be critically addressed. In particular, my focus here is on the ways in which the dominant discourse of 'ethical concerns' serves to defend by rendering invisible the problematic (*inter alia*, ethical) human commitments embedded silently within the larger policy culture (Dillon, 1995).

In summary, all the dominant approaches assume that ethical concerns can either be scientifically defined—by defining (and weighing) consequences—or else they are solely matters of private, individual choice which can be resolved by market mechanisms

alone. I will show how these fundamental representations of public ethical concerns systematically deny and delete what appears from social research to be a central aspect of typical public judgements of the policy handling of GMOs. This dimension is the inability of scientists to recognize the limits of the knowledge which they advance as justification of policy commitments, including claims that the risks and consequences are (or will soon be) adequately known.

The institutionalized divorce of risk concerns from ethical concerns, and the consequent construction of each of these distinct categories, fails to see that public meanings and responses do not even fit these categories, let alone agree or disagree with them. Thus they fail to see that a definitive element of public judgement in this case is a combined ethical–intellectual judgement of the exaggerated claims being made by scientific experts about the intellectual power of the scientific risk knowledge which supposedly has sovereignty over the larger issue of consequences, and which is even assumed to define the essential meaning of the public issue of GMO innovation.

This dominant discursive construction thus obscures and denies one of the most potent and negative public judgements of the GMOs issue. These judgements are less a (mis)judgement of the risks per se, than a deeper public rejection of this very discourse which expert institutions use to define and give meaning to the issues and to the public. It cannot be over-emphasized that this risk–ethics discursive framing is also a projective construction of the public, one which allows its scientific and policy authors to evade critical scrutiny of their own cultural assumptions and interwoven intellectual claims.

Thus the dominant ethical discourses become (probably unwitting) accomplices to the systematic patronization of the public as intellectually vacuous, and to the protection of scientific institutions from the necessary process of critical self-reflexivity about the implicit limitations and contingencies of their own knowledge which is being given unqualified sovereignty. Moreover, it is not just being given sovereignty as key information for policy, but as the very culture of policy—that is, defining the very meaning of the issue. The public's combined intellectual–ethical judgement of scientific knowledge is also a judgement of the quality of the institutions which are the proponents of that knowledge, and which appear utterly unwilling to render that knowledge-culture accountable to public discussion of its limitations. These include the predicament that we can

never credibly pretend to control (neither practically nor intellectually, in the form of prediction) the consequences of our decisions and commitments.

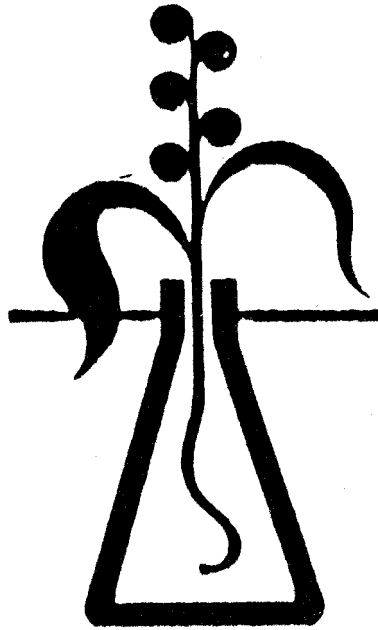
Levidow and Carr (1997) have criticized the form of the institutionalized expert and policy discourse of ethics in the case of GM crops and foods. Anticipating some elements of my critique, they noted the way in which the split into 'risk' and 'ethics' as if distinct dimensions unduly reduces the recognized ethical dimensions. They identified an implicit unacknowledged set of ethical choices—a hidden ethical agenda beyond the explicit ethical issues—which are embodied in regulatory processes. However, as their focus was the discursive constructions, particularly the hidden ethical choices, involved in GMOs' regulation, they did not identify the implicit constructions of the public, its capacities and its forms of judgement both embodied and reproduced in those dominant discourses.

In this essay, I go beyond Levidow and Carr to focus on leading accounts of the ethical dimensions of public concerns; and I uncover the implicit, unquestioned assumptions being imposed about the public, its concerns, the public policy issues, and the knowledge which supposedly enlightens the policy handling of them. This leads me to identify the ways in which, as a parochial cultural syndrome, these dominant 'rational' discursive categories pre-emptively protect from critical self-reflection and public accountability, the dominant self-consciously scientific and policy institutions which promote, regulate, research, and make policy on GMOs.

It is important to emphasize that the critical focus of this essay is not GMOs as such, but the mode of policy culture, especially the linked aspects of: (a) how science has become the unreflexive policy culture rather than its key intellectual resource; and (b) the corresponding unaccountable public representations which this policy-scientific culture imposes.

■ MYTHS OF 'REAL VERSUS PERCEIVED' RISKS

The early expressions of public concern about new technologies in the post-war era, the most dramatic case being nuclear power, were met with a monumental wall of expert puzzlement at the irrationality of such widespread primitive reflexes. Apparently the public could recognize neither the huge benefits which were assumed to be



Credit: Jessica Parry

brought by these enterprises, nor the trustworthiness and presumed credibility of the scientific and technical experts in charge of them. With hindsight we can now see that a major factor in converting what was (even in the 1950s) widespread but localized and largely unmobilized public concern, into public protest and overt opposition to nuclear power in the 1970s, was not only the escalation of risk and of risk perceptions as the programmes and associated accidents grew, but also, more fundamentally, the wholly inadequate, unaccountable and provocative ways in which those expert discourses and behaviours represented the public and its concerns (e.g. Krimsky and Golding, 1992).

These usually implicit representations were not projected by their scientific authors in some supposed rational self-reflexive spirit, as falsifiable hypotheses to be tested in the public domain. They were simply imposed on the public without reflection, question or negotiation—indeed probably without awareness at all. In this deep sense, as routinized habits of thought not objects of deliberative attention, they constituted the culture of scientific rationality as this was institutionalized and articulated in the public domain of science for

policy. Public protest and withdrawal of legitimacy from those technological programmes like nuclear power was arguably at least as much a response to those representations of the public in the dominant scientific discourses, as it was to the risks per se (Wynne, 1980, 1982, 1987).

This point about public responses and their supposed object has been made before, both about the nuclear issue and more generally, but it seems to be a difficult insight to digest, especially in policy circles. There has been 20 years or more of research demolishing the self-destructive fallacy of the 'objective risk versus perceived risk' characterization of the nuclear public conflict issue, which was assumed to describe the deep and irreconcilable gulf between institutionalized scientific views and public views of the issue (Slovic, 1992; Cvetkovich and Lofstedt, 1999). Despite this apparent falsification, and despite repeated lip-service to its obsolescence, the same basic construction of the public has prevailed to shape dominant framings of the current controversies over GM crops and foods.

Of course, nuclear power led this characterization of the public perceptions issue, and was arguably the first and still most prominent victim of its own institutional delusions in this respect. At the same time, this 'real, objective risk versus subjective, perceived risk' framing was more deeply institutionalized in modern risk-management culture across the whole of policy thinking and practice. In this sense it represented the pervasive modern model of the relationship between scientific knowledge and popular culture, i.e. between the worlds of 'facts' and 'values' (or emotions).

Thus for example, Sir Frederick Warner, one of the international godfathers of modern risk management, described the normative definitions of key terms in 1979 British Standards Institute terminology:

An important distinction is brought about in BS 4778 (section 13) where it deals with risk assessment as incorporating risk quantification and risk evaluation: 'This separation can be beneficial in avoiding confusion between the objective process of risk quantification and the essentially subjective interpretation of the significance of estimated risks' (Warner, 1981, p. x).

Significantly for later in my essay, the BSI document then dealt

with uncertainty in a way which reinforced this categorical division between objective quantification and subjective evaluation (or perception):

Risk quantification cannot measure risk acceptability ... Moreover the uncertainties in the quantification do not become entangled quantitatively in the process of judgement. They are simply determinants of the potential range (or perhaps distribution) of variations in the value of the quantified risk. This range can be assessed for acceptability (p. xi).

It might have appeared as if, and been assumed that, this dealt with uncertainties and their public evaluation in a comprehensive way—but it emphatically does not. The uncertainties recognized here are only the known uncertainties. This totally and silently excludes from consideration the unknowns, which result in unanticipated consequences, and which reflect lack of intellectual and practical control. I return to this later—it is entirely typical of institutional practice—but for the moment, let us note from this BSI official normative statement that a lack of perceived need for any collective explicit reflection on the quality of available scientific knowledge was institutionalized into policy culture. This syndrome has continued and developed in UK and probably wider policy culture.

In this essay I want to explore some of the ways in which this same basic dichotomy between objective and subjective—the factual and the emotional—is shaped and sustained in the current GM crops and foods issue. In this manner expert discourses of the issue are unquestioningly taken to be grounded in reality, even if this may sometimes be for the time-being only ‘imprecisely’ grasped, whereas public discourses are essentially groundless and emotionally based only. This is captured in the typical view, expressed in a UK Biotechnology and Biological Research Council report, that ‘Many people know little about biotechnology. This may make them frightened about its implications for our lives’ (UK BBSRC, 1996, p. 2). The direct falsification of this view by social scientific research since at least the early 1990s appears to have had little impact (Wynne, 1987; Martin and Tait, 1992; Irwin and Wynne, 1996; BEPCAG, 1997). I wish to throw some critical light on the underlying dimen-

sions of these institutional myths in dominant policy culture, including significant areas of social and human sciences.

I have characterized expert representations of the public as follows: that expert knowledge is grounded in reality whereas lay knowledge and attitudes are politically real but intellectually unreal. This characterization may seem far-fetched in the face of the mushrooming official enthusiasm for public involvement in expert deliberations about GM risk and regulation, and the manifestly more transparent, more participatory climate of expert advice and decision-making in the GM era compared to the nuclear heyday of 25 years earlier (e.g. May, 2000). However, just as nuclear experts latterly admitted what they dubbed 'the political fact' of more stringent public perceptions of nuclear risk as an objective human reality which had to be politically accommodated, they still saw this as based on factually ungrounded and extreme exaggeration of the objective reality of the risks as known to scientists. Thus, although it was eventually recognized and 'accommodated' by the experts—for example in stricter regulatory standards—rather than, as it had been, summarily dismissed as emotive fantasy, this accommodation rested on the same basic grounds, that the public's attitudes were not rooted in real intellectual substance, but merely in emotion.

Thus the accommodation of the political fact of public opposition was always grudging, condescending and strictly in terms dictated by the experts' still-unquestioned basic assumptions: (scientists') knowledge which reflected reality, versus public 'knowledge', which reflected 'how many people would be frightened rather than how many would be killed', as it was dismissively put by one radiation expert advising Cumbria County Council about the Sellafield nuclear plant (Fremlin, 1987). This political accommodation thus did nothing to dent or question the continuing conviction that this was an objective issue, on which the public was not only wrong but congenitally incompetent to play a role in handling such issues.

Overlapping with these institutionalized ethical discourses specific to the GMOs issue are the burgeoning initiatives for public involvement, dialogue, listening to the public and the like, which hardly existed in the intense period of nuclear conflict. Yet these public involvement initiatives betray profound confusion as to what the purposes, conditions, and terms of this public involvement are or should be (Rowe and Frewer, 2000). Underpinning and fuelling this

confusion, the 'objective risk versus perceived risk' mythology has survived its own apparent overthrow, and not only in the nuclear domain. Although in a new context it has taken on more disguises and variations, the old mythology remains the dominant influence shaping the GMOs issue. I suggest that it is again one of the fuelling forces of public controversy, inadvertently self-inflicted by expert institutions.

The new and high-profile ethical agenda for GMOs also reflects these fundamental and deeply problematic commitments. Indeed it has in some ways allowed their further intensification, because it has provided an outlet for public concerns which can give them legitimacy and public policy standing, whilst defining them as emotionally based and thus intellectually vacuous and irrelevant. A key corollary of this is that, in dividing scientific matters and ethical concerns so absolutely, scientific knowledge, commitments and assumptions are protected from critical collective public examination including critical self-reflection on the part of those institutions defining and dominating the policy agenda. To this culture the idea is unimaginable that ethical concerns might have different meaning to those assumed. It is thus unimaginable that those ethical concerns might be interwoven with knowledge-issues, and might be intellectually substantive and amenable to rational debate even if not deterministically resolvable.

Thus the particular aspect of the GMOs public responses issue which I wish to examine in this essay is the apparent status given to 'ethical concerns', reflected in the high status of bioethics committees, ethical discourse generally around even GM crops and foods not only human and animal genetic manipulation, and the apparent respect given to public concerns defined as 'ethical'. I will suggest that this is a genuinely motivated apparent shift as reflected in the broader 'ethical turn', towards giving public concerns more of a serious voice in expert-led policy. However I will argue that this shift, and the wider public involvement move, is seriously compromised by the inadequate way that it is still framed in subordination to the false 'objective-versus-perceived' dichotomy.

Social scientific research on what have been rather too easily called 'public risk perceptions' has played an ambiguous role in this after-life of the objective-subjective mythology. Early dismissals of negative public responses to nuclear power were based on simplistic

quantitative comparisons of the ‘risks to the public of nuclear power’ with ‘risks which the public apparently accepts every day’, which showed that in these terms nuclear risks were much lower than those routinely accepted ones like car-driving, drinking wine or even smoking. By contrast, psychometric social science showed that there were many other, qualitative attributes of risks which people also found salient, and on which nuclear power scored badly (Slovic, 1992). Examples were: its unfamiliarity; its potential to produce highly concentrated units of harm; the untrustworthiness of its institutions; and the non-voluntary nature of the risk. These factors appeared to explain the negative public judgements of nuclear power, and to render them more rational, in a more complex way which had escaped the arrogantly imposed rationality of the experts. The scientists had, without awareness it seemed, artificially reduced the salient dimensions of ‘risk’ to a small segment which did not adequately represent the more complex and multivalent way that ‘risk’ was typically defined by the public.

However, when this valuable insight came from Slovic and colleagues as the leading social scientific approach to public perceptions, it did not fundamentally challenge the still-unquestioned common assumption that the focus of meaning was objectively and universally about *risk* (Wynne, 1989). This public meaning was assumed to be an objectively given meaning. Thus whilst criticizing scientific perspectives in some respects the psychometric research uncritically reproduced the more basic scientific assumption: that for the public, risk (a scientific matter) was—along with benefits, which were simply presumed—the only meaning of the nuclear issue. This framing was rendered more complex and multivalent by social science, but was not rendered any less deterministic nor less universal.

■ ETHICAL AND TRUST CONCERNS

Even well before the crisis of public mistrust and rejection traumatized the proponents of GM crops and foods, the public acceptance issue had been a central preoccupation for scientists, industrialists, and policymakers. These institutional discourses shaped the dominant cultural representations of both the issue and the public. As a result also, social scientific research on public perceptions of GMOs

has been an influential policy actor, and a major focus of research–industry–policy interaction. In key respects this social scientific programme reflected the same presumptions as its nuclear ‘risk perceptions’ counterpart: that public concern was about risks as properly defined by scientists, and opposition was thus ungrounded in reality and based instead on misunderstandings, ignorance and emotions. Apart from those qualitative factors noted above, especially trust, the public was deemed incapable of establishing its own frames of meaning in connections with risks, since this was taken to be a scientific matter. The benefits were simply presumed, and the public meaning thus also presumptively imposed that this was a risk issue, hence a scientific one. The UK Prime Minister’s statement about GMOs on the opening of the G8 summit in Okinawa Japan in July 2000 exemplifies this presumed meaning.

Thus the public was left either to recognize and accept what scientists said about the risks, or—if they deviated—to be defined as irrational and emotive. The idea that the public might have different, autonomous frames of meaning, which rendered other things salient, was never imagined or entertained. This possibility is still not adequately understood, despite attention to this point by the prestigious House of Lords Science and Technology Select Committee, for example (2000).

When the idea was first proposed by Wynne (1980) that public reactions to risky technologies were not just reactions to (their understanding of) the risks involved, but also to the behaviour, track-record and trustworthiness of the institutions in charge, this argument about public trust envisaged this element of public reaction as an essentially instrumental form of reasoning. The logic was as follows:

Responses to new technologies are based not only on the question which science addresses, namely ‘what are the risks?’. It is also based on the further recognition that the risks as known to science exclude the important category of ‘unknown’ and unanticipated effects. Historical experience shows these to be of at least as much importance as known risks, the domain of scientific risk assessment. Given that the focus of public concern is thus justifiably on surprise and how it may be handled, it is logical for people to ask, ‘who will be in

charge of the necessary adaptive responses to such unknowns when they occur? And given that we depend on them, and their responses will control society's fate, what is their track-record and their *trustworthiness*?'.

Thus I suggested that the previously unrecognized public focus on the issue of trust could be seen, not as a purely emotion-based response, but as one combining and informing emotional orientations with a rational calculative one deriving from public awareness of inevitable ignorance behind science. It was not a naïve (much less insatiable) demand for certainty, as this 'mistrust' is often represented. Rather, it was a recognition that uncertainty is inevitable, and thus a demand that the implications of this endemic predicament of science and its dependence must be taken seriously. One consequence, again found in public responses, would be to have proper debate about whether the human purposes (of whatever innovation is in question) were sufficiently important to justify taking on such unpredictable possible effects, and about whether the forms of innovation, promotion and regulation were sufficiently trustworthy to defend the public interest.

Despite my initial characterization of the public trust concern as one founded in (fallible) reason and judgement of the unacknowledged limits of dominant legitimatory scientific discourses, public mistrust has typically been completely misunderstood and patronized, being misrepresented as a 'touchy-feely', emotionally based concern, with no intellectual substance at all. I have already referred to the bald assertion that 'trust is a functional substitute for knowledge', according to an influential social science team involved in public perceptions, responsible for the four Eurobarometer GMOs public attitudes surveys of 1991, 1993, 1996 and 1999 (BEPCAG, 1997). In an identical representation, another prominent US analyst of public attitudes to risk asserts that 'the less comfortable we are with assessing the technological evidence, the more stock we must put in evaluating the social evidence (for example of trust)' (Hornig Priest, 1999).

This framing of the issue of public trust or mistrust in risk and regulatory science thus again explicitly constructs it as intellectually vacuous, trust being thought to be necessary only when we are ignorant. This also reflects the mistaken assumption that trust is only

a necessary question when technical expertise is lacking—as if scientific belief and knowledge were not also pervaded by trust, emotion and faith.

The Eurobarometer approach has the further crucial effect of protecting from public view the incapacity of science to identify all the significant consequences of innovations, yet the public sees this anyway, according to research fieldwork (CSEC, 2000; Louet, 2001; Levy and Derby, 2000). So this framing of risk and trust issues serves mainly to encourage and reinforce the self-delusions of institutional science that it can adequately and definitively test for all the risks and knows all the uncertainties in its own knowledge. That there might be questions here is pre-emptively buried from scientific self-awareness. Thus this framing effectively acts as a myth which sustains existing power-structures and institutional cultures around GMO innovation, development, regulation and exploitation.

At the same time it engenders alienation and suspicion on the part of the public. When facing scientific institutions and their discourses, including many social scientific discourses, people experience a state of denial. Public responses are more responses to this cultural syndrome of institutional science and policy, than to perceptions of risks or ethics per se. Of course, such institutionalized denial can be criticized on ethical grounds; but this public attitude should be recognized as both an ethical and an intellectual judgement together—of the purveyors of prevailing risk-knowledge and their claims for its objectivity, adequacy and authority.

I argue that the recent ascent of the 'ethical' in the issue of public responses to GMOs has been framed in a basically identical way to the hideously insensitive, conceited and self-defeating one outlined above. This is not only a policy failing but a failure in academic research understanding given to policy bodies. That is, public perceptions, responses and acceptance issues are seen as arising from emotionally inspired and essentially intellectually vacuous ethical and trust concerns. However much they are recognized as legitimate or as political facts, such concerns are not given nearly as much weight as scientific knowledge about risks. They are also not recognized to be what they are, which is public judgements of the quality of existing knowledge, and of the exaggerated claims made for it by scientists and the policy bodies they advise. Instead they are subtly reconstructed so as to delete these questions from attention. The ethical

dimensions of the scientific knowledge culture itself, including its own self-delusions and lack of reflexivity about the quality of knowledge it provides, and of its own organizational forms of ownership, control and direction, are thus silently deleted from problematization as a public issue requiring public deliberation.

In this respect it is significant that a major corporate statement on 'Environment and Bioethics' from a progressive biotechnology company, added the Bioethics issue to its established Environment annual corporate report (Novo-Nordisk, 1997). The issue of 'Public Acceptance of Modern Biotechnology' was defined as a subsection of the Bioethics issue, along with animal welfare and compliance with legal requirements. That any other concerns besides 'ethical' ones might be driving the fast-growing public acceptance problems seemed to be inconceivable. In the same report, risk issues were confidently described as unproblematic because 'only after thorough evaluation of the possible risks associated with every single GMO will the authorities grant a production permit' (p. 31).

This framing again reproduces the categorical separation of risk-scientific from ethical questions, and thus totally deletes questions about the quality of existing scientific knowledge for policy—whether thorough and adequate risk assessment is always possible, what value-assumptions structure it, and why it is invariably beset with contingency, and lack of full predictive control. Thus again also it was implied that the public's 'ethical' concerns do not involve intellectual substance, which is the scientific terrain reserved for 'risk'.

■ EXPERT ETHICAL REPORTS: FRAMING THE PUBLIC AND SCIENTIFIC CULTURE

I now examine some leading expert reports on the ethical issues which are taken to underlie public concerns about GMOs. As described below, these indicate several common but unstated implicit assumptions and understandings which are utterly unexamined and thus uncritically reproduced, yet which crucially shape their 'findings' and assertions for policy.

□ *UK Biotechnology and Biological Sciences Research Council report*
The UK BBSRC Report on Ethics Morality and Crop Biotechnology

(UK BBSRC, 1996) makes some distinctions between moral and ethical concerns before turning its attention to how to evaluate moral concerns about GM crops by the stricter forms of reasoning which they call ethics. The discussion centres on the oft-dissected and criticized claims of opponents that GM crops are uniquely a case of humans ‘tampering with nature’, and the distinction offered between ‘intrinsic’ and ‘extrinsic’ ethical concerns. Although it starts from some sound premises—for example that ‘science cannot be pursued in an ethical and moral vacuum’—it reproduces others that are more problematic. These include the fundamental meanings given to ‘risk’ and ‘ethics’ concerns, and the expression of these meanings as if they were purely natural, objective and thus given—as if they were not themselves a cultural construct embodying human agency and responsibility. Therefore it is important to identify the report’s implicit framing of the questions and issues as ethical and scientific.

For a start, the report states that ‘worries are being increasingly expressed that the potential benefits of biotechnology may be lost if the new processes and products fail to gain “consumer acceptance” because of moral concerns that warrant more disciplined ethical scrutiny’ (p. 3). This again suggests that public concerns are only moral, not intellectual: ‘we all probably hold some moral views unthinkingly’, having failed to subject these to rational deliberation and reflection, and to conscious analysis of an ethical kind. The suggestion is then that public moral concerns about GM crops tend towards their rejection, and they are ‘unthinking’ and need disciplining by ethical scrutiny.

It is a relevant question to ask why the problem was phrased in this way—that ethical concerns, if not properly scrutinized, might obstruct GM products. We could ask why the problem was not phrased in an alternative way, e.g. by asking whether present understandings of the ethical and scientific issues are encouraging an irresponsibly precipitous rush into GM commercial exploitation—indeed, acting as its rationalization because of fears of losing out in global competition. Such an alternative would ask why ethical considerations are not seen to apply to scientific research, but only to its ‘applications’—a boundary which has been so severely and deliberately eroded in just the same period where GM science and technology has developed.

Part of this ethical focus on the scientific knowledge itself would have meant asking why public ethical concerns are not recognized to be focussed on the issue of the quality of the scientific knowledge which is claimed to justify promotional commitments, and on the repeated denial of any public issue of the limitations of scientific knowledge and the lack of transparency of this whole intellectual culture? These ethical questions cross the artificial boundary between the ethical and scientific—a boundary which is constructed and defended as inviolate in the dominant discourse, because they are (of course fallible) intellectually based ethical judgements of the knowledge-authority in play.

Qualitative research going back at least 4 years in several projects on public perceptions of GMOs shows these kinds of judgements to be incessantly expressed as central elements of public concerns (Grove-White *et al.*, 1997, 2001; CSEC, 2000; Louet, 2001). Yet they have no place in the existing framing of the issues. Indeed, in this respect the recent apparent accommodation of the ‘ethical dimensions’ makes the situation worse, since it appears to address a fundamental issue—only to misconstrue and conceal key features of it.

In the BBSRC ‘Ethics’ report, one public ethical critique of the intellectual culture of GM risk science is addressed—in apparent contradiction of my criticism of the absolutely impermeable boundary enforced between risk and ethical dimensions of concern, and the consequent systematic deletion of this combined ethical-intellectual critical public judgement. This ethical issue which the BBSRC report did acknowledge is the reductionist culture of science in this field, which has been attacked by opponents like Jeremy Rifkin, and even criticized in UK regulatory culture by scientists, NGOs and policymakers (Levidow *et al.*, 1996; CSEC–Green Alliance, 1996). The response of the BBSRC ethics report is to note—correctly in principle—that reductionism is a problem for all scientific culture, including social science, which often reduces people to statistics or behavioural automata. Therefore in principle, there is nothing ethically special about GMOs in this respect.

However, this dismissal of the reductionism issue is wholly inadequate. For a start, the generality of the problem says nothing about its deemed importance in the particular case of GMOs, where the kinds of role and influence of reductionist representations in GM crops are totally different from those in, say, economics. Also the

claims being made as public authority and representation, by GM science on the one hand and economic science on the other, may again be wholly different, especially when measured against the commitments being promoted. These have ethical dimensions which cannot be distinctly categorized as only about reductionism, or over-commitment, or exaggeration of intellectual control of future consequences. Rather, they must be recognized as concerns founded in the symbiotic combination of these together in a much more seamless web of dominant knowledge, practice and legitimation—a whole institutional culture. The atomistic and positivistic definition of the ethical issues which informs the BBSRC report is quite unable to recognize these cultural features of the institutionalized science, so they are silently and quite innocently deleted. Inevitably the deletion operates to protect this culture from self-examination as well as from wider public debate and accountability.

As regards this atomistic framing of the scientific and the ethical, and of reductionism and over-commitment questions, a similar problem arises when the BBSRC report discusses ‘disrespect for nature’ as a public moral concern about GM crops. The authors draw upon two arguments in addressing this. First they assume, apparently without question, a definition of ‘respect’ wholly in terms of individual motivations, thus deleting any questions of how the whole culture of research, manipulation and exploitation which is involved in GM crops might be relating to nature. These are not at all the same, even though they involve complex inter-penetrations. Moreover, the authors again atomize the ethical questions so that the issue of disrespect is nowhere connected with the crucial issue—scientific ignorance and unknowns. If taken into account, this issue may radically alter the sense of possible ‘disrespect’.

Thus the BBSRC report’s discussion addresses the issue of disrespect by asking solely about the ethical status of the manipulation of nature. Beyond that account, we can relate genetic modification and irreversible release of biologically active agents into nature to the further questions—ignorance about environmental consequences for which science still has no answers, and the neglect of this ignorance. Then the issue of disrespect takes on a completely different flavour for GMOs than it might do for traditional plant-breeding. Of course, the latter still involves uncertainties and ignorance about effects, but there is a much less ambitious form of

interference and less ambitious claims of intellectual control, and a much more relaxed timetable over which it is done. The ethical issue of 'disrespect' cannot be divorced from the intellectual issue of what kind of knowledge we have and what claims are justifiable to make for it. To do so again seamlessly evacuates the policy understanding of public ethical concerns about GMOs of any intellectual substance.

Moreover the possibility that the central object of public concern is not GMOs per se but institutional behaviour in relation to them—again a hybrid concern in which both intellectual and ethical interact—is not even imagined. Further, the idea that these institutional problems might be embodied at a level of cultural practices distinct from individual motivations, is nowhere imagined in this framing and discussion of public 'ethical' concerns.

One might expect or hope that this combined and multivalent nature of public concerns might be recognized where possible consequences are given ethical judgement. In this domain, the 'aim [is] to identify the range of moral concerns felt about the consequences of crop biotechnology and to analyse the logic of these concerns' (p. 17). Yet again, this problem is framed as the exercise of 'value judgements' about consequences, good and bad. Nowhere does the report air the more reflexive and essentially relational dimension of public concerns and responses—that people might also be responding to how the scientists are characterizing not only those consequences, but also their scientific knowledge of them—and also, further, the public itself.

The report recognizes the issue of unpredictability of the consequences from GM crops, but again rather glibly dismisses them on the (pedantically correct) grounds that this is a universal problem not specific to GMOs. 'History has demonstrated how all new technologies inevitably have far-reaching effects. Crop biotechnology cannot then be singled out as the sole target for moral censure on these grounds, any more than can information technology or the steam-engine.' In practice, 'far-reaching effects' here means lack of intellectual control by science over future consequences. The syndrome of institutional denial of this lack of control, of dismissing unpredictability, is simply not addressed as an ethical issue which might be fuelling public concerns and mistrust. Scientific and policy bodies have some responsibility to address public concerns in those terms—

rather than patronizingly representing public mistrust and ethical concerns as essentially emotional, and intellectually vacuous.

□ *Eurobarometer reports*

A similar framing is reproduced by the Eurobarometer studies already cited (BEPCAG, 1997; INRA, 2000; Gaskell *et al.*, 2000). As already noted it assumes a categorical distinction between risk and ethical concerns about GMOs, and allows this highly significant and problematic framing assumption—and the researchers' assumed meanings of 'ethical' and 'risk'—to be reproduced without anywhere being tested. The category of 'knowledge' in the study is constructed as a single-dimension measure of public knowledge of GMOs, so as to correlate levels of knowledge with attitudes. There is confusion about what 'knowledge' is in this context. Indeed, there is no explicit reflection on the quality of knowledge in play, e.g. when risk and ethical issues are framed as if they could be cleanly separated into the cognitive and emotional dimensions.

Although the study team recognizes that attitudes 'consist of both cognitive factors and emotions', they assume a one-dimensional hierarchy of possible 'knowledge' about GMOs, which means that:

Knowledge may increase the individual's capacity to understand new information and arguments, and personal involvement may lead to a more critical consideration of the arguments. Lack of knowledge or interest on the other hand, usually means that an attitude is based less on the contents and more on the context of the information, e.g. the media. Lack of awareness can lead to diffuse and unstable attitudes ... Higher education can lead to more cognitive based attitudes. This is the basis for a relatively stable and cognitively based attitude.

In defining the relationship between emotions and cognition in public attitudes, they are treated as mutually contrary, so that more cognitive content means less emotion in attitudes, less 'context, e.g. media' and more 'content'. Note also that the distinction between 'context' (influenced by media for example), and 'content' (influenced by higher education for example) reflects an assumed hierarchy in which content is 'real' and 'context' is something else.

Yet it is just as much a content-based dimension of public understanding of (and response to) 'science' to emphasize its institutional forms of ownership, control, direction and regulation, as it is to emphasize its cognitive contents like whether antibiotics kill bacteria or viruses. Public understanding of science research has analysed the former concerns for at least a decade (e.g. Wynne, 1991; Prewitt, 1982). To define these institutional dimensions as 'context', and relegate them to media-propagated dimensions, is to reproduce and impose a presumed definition of the sovereign meaning of the public issue as a science-centred meaning. Yet public responses are saying it is not just a scientific issue; it is centrally about the social relations involved—about accountability, control, direction and representation of science as a creator of innovations and a culture of public policy. In short, it concerns the undemocratic control of public meanings.

It could be thought that this issue had been addressed by the Eurobarometer team. Despite its use of distinct risk-ethics categories, the 1997 *Nature* paper does conclude with an overall recognition that risk and ethical dimensions of modern science and technologies are converging: that 'risks are fundamentally moral and political' (BEPCAG, 1997). Unfortunately, however, as we shall see with another treatment of the ethical and social dimensions of GM crops below, this acknowledgement alone does not address the basic issue. The ethical dimensions are presumed to be about consequences, without addressing how we should deal with the unpredictability of these, nor the questions about the reliability of our knowledge more generally as justification for commitments which will generate unanticipated effects for which no one will admit responsibility—an ethically provocative orientation. The next case brings these issues into focus.

□ *Nuffield Council on Bioethics report (1999)*

The Nuffield Council on Bioethics operates under the auspices of an independent private foundation, though it is treated unofficially by the UK government as a quasi-official body dealing with matters of public interest which policymaking finds difficult to handle directly. It issued a major report on the ethical and social aspects of GM crops in May 1999. The report noted that the ethical issues raised by

global GM crops commercialization ranged across the security of the food chain for all people—including future generations, food safety and environmental sustainability. The report assumed that all these could be treated in broadly utilitarian terms—that is, by assessing likely consequences—but that in addition there was the non-utilitarian issue of whether GMOs should be considered to be ‘unnatural’, as has been prominently claimed.

The ‘unnaturalness’ question was resolved by this committee in rather similar manner to the BBSRC report’s treatment. That is, it was argued that since no clear and definite line could be drawn to distinguish GM crops from conventional plant breeding, then GMOs could not be rejected on the ethical grounds that they are a non-natural form of intervention in nature.

However the questions treated by the Nuffield Council as utilitarian are more revealing here. It is notable that this way of defining issues as utilitarian implicitly assumes that the consequences can be confidently identified, so as to be weighed as ‘costs’ or ‘benefits’. However, this assumption ignores the very issue raised by typical public concerns—whether we should assume that science can indeed reliably identify future consequences, or whether to the contrary, there are going to be consequences of which current knowledge is ignorant, or which are contingent on so many independent conditions that we can only say they are conceivable but with unknown likelihood, so also (like the unknowns) uncontrolled.

Both kinds of consequence lie outside the boundaries of intellectual control (much less practical control) offered by current scientific knowledge, yet the report nowhere recognizes that this is an issue in the ethical and social aspects of GM crops and public attitudes. Indeed, this is underlined by the report’s overall ethical conclusion about the consequences question: ‘the working party does not believe there is enough evidence of actual or potential harm to justify a moratorium on either GM crop research, field trials or limited release into the environment at this stage’.

This way of framing the question implies that the issue of consequences as an ethical issue involves looking only to the empirical evidence already available. Yet in question is exactly this—in strict terms, logically absurd—implicit assumption of the institutional culture (including here the Nuffield Council on Bioethics). Namely, it assumes that we could expect empirical evidence to

reliably examine the domain of the unknown. The caveat about 'at this stage' is a common language of escape from the oblique realization that there is something deeply problematic about these assumptions of reliable knowledge of consequences, as the precondition for a meaningful utilitarian ethics. The escape clause—implying that science will in future know—is a shallow evasion which still has to rely on faith that future science will be able to answer the key questions definitely. This does not answer the issue, and it systematically and endlessly defers recognition of the deeper need to open up the human purposes and forces driving scientific research to wider accountability and debate.

The point of this ignorance issue to the public, as our fieldwork has shown, is not to conclude that therefore innovation should be stopped—as it has been suggested, and for which the public has been mistakenly lampooned for demanding. People are not anti-uncertainty, indeed they take for granted its existence, and the lack of control which it signifies. They seem to be saying that the unanticipated consequences issue should be explicitly connected with the foreclosed question of purposes—'why are we doing this?'—a question which publics ask incessantly in fieldwork situations, and which goes beyond unqualified claims of 'benefits'. If the purposes driving research and innovation are sound, then uncertainty will likely be tolerated; but if they are not, or are simply unaccountable so that no-one can even tell, then why should it be tolerated?

Thus, as in the other influential treatments of the ethical issues of GM crops, in this high-profile analysis too the ethical and risk dimensions are categorically divided. The ethical aspects of risk are assumed to be only about their scale and distribution, which are assumed to be known. The crucial further issues about whether we can or do reliably know enough, and what we should do about inevitable ignorance, are not even recognized as questions. Even when consequences are recognized to be part of the ethical domain, the two crucial issues of public concern where the ethical and the consequences questions combine, that is over the inherent limitations of scientific knowledge to be able to identify all the consequences, in the context of the exaggerated claims being made for it, are yet again not even hinted at.

This issue, seamlessly deleted from the defined substance of public concerns, focuses not on risks as the well-spring of meaning,

but on the behaviour—including discourses of risk, and of ethics—of the dominant science-led institutional culture. This includes its tacit but powerfully (and innocently) provocative representations of the typical public and its concerns.

It is instructive to compare the framing categories of the Nuffield Council report with another by the independent Food Ethics Council (1999). This latter analysis too adopts a consequentialist perspective, but then it applies three basic ethical principles of well-being, autonomy, and justice, to the likely impact of GM products on biota, producers, and consumers, while differentiating between developed and developing worlds. This approach, which even uses the term ‘ethical impacts’, can be criticized.

Nevertheless the Food Ethics Council makes a major advance in taking seriously just what that conventional approach utterly ignores, as in the Nuffield report—namely the predicament of lack of intellectual control (full predictability) of consequences. Although its report adopts a consequentialist ethics, its reflective approach to the quality of knowledge about consequences leaves it with an intrinsically and explicitly open utilitarian calculus. For example, on one dimension—effects of GM crops on wildlife—rather than attempting to justify one propositional stance on impacts as definite, the report concludes that ‘Unlike most other forms of technology, unforeseen problems with biotechnology could be almost impossible to correct because GM organisms colonise the wider environment’. And it performs another key appraisal role not seen as necessary by more intellectually convinced and deterministic assessment cultures: it recognizes the corresponding need for a broader comparative appraisal of alternatives.

□ *European Federation of Biotechnology report (1999)*

For many years the European Federation of Biotechnology (EFB) has had a Task Group on Public Perceptions of Biotechnology. It is drawn from a wide-ranging mixed academic, industry, NGO and media-communications industry membership from European and Scandinavian countries. It has been funded for over 10 years by the European Commission, and has close contact with Commission policymakers and advisers on biotechnology. Therefore this report can be taken to reflect commonly held assumptions across a large

international sector of specialist understanding on the issues of public concerns and responses to GM agriculture and food.

This report notes the rapidly growing influence of the ethical issues around GMOs in public responses. It also recognizes that in principle, for medical applications at least, 'although safety regulations do exist, unforeseen and unwanted consequences may still occur' (p. 6). However, there is no indication at all that this condition poses its own distinct ethical questions connected with whether this lack of intellectual control is recognized and properly handled. Nor is there any recognition that as a significant facet of its 'understanding of science', the public may be aware of, and may give prime salience to, this predicament of scientific ignorance. Instead the familiar association is made between increased public concern, and its presumed cause—public ignorance. Thus in discussing the apparently greater public objection to GM crops and foods than to GM medical therapies, this is gratuitously attributed to 'most people's relative ignorance about modern agriculture and food production', by contrast to their knowledge of medicines and healthcare.

The familiar distinction between utilitarian (consequentialist) ethical questions and deontological ones (questions of intrinsic rightness or wrongness) is made. Immediately after abstractly recognizing the problem of incomplete knowledge, the GMOs issue is equated as an ethical issue with that of whether it is justifiable to impose imprisonment for motoring offences such as reckless driving. The report explains that a utilitarian approach would need to examine the consequences of imprisonment and of alternatives.

Having used an analogy in which questions of ignorance about the consequences of imprisonment or fines or other alternatives are clear and unavoidable, the report does not transfer this crucial point to the GMOs case. Rather, it is simply passed over and deleted. The fact that this is done so unwittingly and seamlessly, and that the sharp contradiction with the abstract statement about unforeseen consequences is not even noted, indicates something about how deeply embedded in cultural routine is this framing out of the implications of scientific ignorance.

Again in the listing of the ethical questions about agricultural GMOs, the consequences are simply assumed to be reliably knowable through science, as the prerequisite for a utilitarian approach. Thus in the ensuing discussion (p. 8 *et seq*) of the problems of a

utilitarian framework, this issue of endemic ignorance about consequences is excluded, despite having apparently been recognized in the abstract. This neglect of the implications of the point about unpredictable consequences seems to indicate something important about the dominant framework's lack of understanding of the fundamental differences between 'risks' (which are by definition, known), and unpredictable consequences, which by definition are not known. This same confusion is evident more widely in policy, for example in discussion of the precautionary principle.

The further, non-utilitarian questions underlying public concerns are taken by the EFB report to be those of 'playing God', and 'unnatural' interference with Nature. These are then problematized in the same way as in the other reports already described. They are taken without question to be literal expressions of a 'real' attitude which can be judged at face value, as an attitudinal 'object' referring to an object-practice, namely GM technology.

The possibility is not even recognized that the expression may refer to experience and judgement of the dominant institutional actors, their alleged hubris and irresponsibility. Thus the public ethical attitude about GMOs being 'unnatural' is problematized just as before; the report notes that humankind has long interfered with nature, so that some objective discontinuity in this historical process needs to be identified for GMOs in order for this ethical objection to be valid. The 'playing God' objection is counterposed to the equally defensible religious position that GM technology represents a responsible partnership with God in developing his Creation.

Both the 'unnatural interference with Nature', and the 'playing God' ethical objections are thus constructed as individual private responses to the technology as object. Public meaning is constructed as the aggregate of such private bilateral relationships between individuals and the technology alone. Such a construct obliterates (even as a question) the possibility that these responses might be derived from essentially relational, thus also endemically social sensibilities, of the perceived ways in which dominant institutions exaggerate the adequacy of existing knowledge, while evading fundamental questions about the quality of that knowledge itself. The systematic avoidance—by a self-consciously rational culture—of this more reflexive and relational question allows public meanings to

be imposed which may be doing violence to the meanings which people themselves invest in the issue.

Thus, in suggesting how 'real concerns' of the public are to be understood, the EFB report reproduces a framing which is identical in key respects with those other influential approaches already examined here. As a further aspect of this typical framing, these discourses project unreflexive constructions of the public which are not only unaccountable, but also deeply normative. This framing delimits 'the public' as '(individual) consumer'—rather than as the more complex, relational and comprehensive notion of 'citizen'.

Thus, once science has been left to take care of consequences, with the ignorance issue seamlessly deleted, this account leaves only the utilitarian ethical issue of weighing costs against benefits, as if these can be unproblematically identified. The remaining ethical issues are reduced to those of: giving consumers choice, e.g. through providing labelling; and 'playing God'.

The latter is effectively reduced to the former labelling issue: if people have legitimate moral or ethical concerns on the 'playing God' issue, then they have the right to choose not to consume GM foods. Hence the need for labelling—which is defined as a private, individual matter, not even conceivably as a public issue of collective institutional behaviour. A major, unacknowledged ethical issue stalks this discursive–normative reduction of collective relations to individual consumer identities.

In this way, crucially, the collective dimension of the 'playing God' issue is also deleted. The report nowhere recognizes the possibility that public concerns about scientists 'playing God' may be an expression of concern about the institutional culture of public policy issue-definition, promotion and 'regulation' of GMOs, including its systematic institutional exaggeration of how much 'we scientists and rational beings know'. This cultural condition of exaggeration is a form of idolatry, or hubris. It can, therefore, be understood as a form of 'playing God'. So too can the assumption embodied in the institutional culture's reaction to public concerns, that science does not just identify the risks and consequences of GM crops and foods, but gives the issue its very meaning.

Instead however, this putative citizen concern about the institutional culture—a concern which again combines ethical with intellectual judgement—is translated into the completely different issue of

private consumer moral rights, i.e. into choice in the market-place alone. When 'representation' is not even recognized as being performed, who will take responsibility for these specific (albeit tacit) representations of the public?

The result of this multi-layered discursive construction is that the whole institutional culture—with its culturally embodied denial of ignorance, and its associated hubris—is protected from problematization and critical deliberation in the policy sphere.

This is a widespread and typical framing of the ethical dimensions of public concerns about GMOs. It was repeated in the other influential reports on this topic, as well as by the UK Prime Minister Blair in his high-profile attempts to recover public confidence after his Government's earlier arrogant dismissals of public concerns in 1998 and 1999. Thus in a newspaper article in February 2000, just before a major OECD scientific conference on GM foods held in the UK, and intended as part of the counter-attack on public mistrust, Blair for the first time acknowledged the ambiguous nature of GM innovation with a headline admission: 'The key to GM is its potential, both for harm and for good'. He then proceeded to recognize that public concerns were legitimate and had to be taken seriously, and defined the 'real public concerns' as those of consumer health risks, environmental consequences, and consumer freedom-of-choice so as to allow for individual moral objections to be exercised. Likewise at the Okinawa G8 summit in June 2000, he asserted that the GMOs issue is a scientific one which publics should respect, thus reflecting the same basic framing as those definitive reports examined above.

Thus again, the more collective and relational dimension of public concerns that we believe we have identified in our social research have been air-brushed out of the picture: that people may be responding to the institutional discourses and behaviours which both presumptively define the issues, and which also thereby normatively but tacitly define 'the public'. This political dependency upon science—not only for instrumental knowledge, but for assumed meaning—is a deeply pervasive and problematic modern cultural predicament. It continues to fuel (what I believe is better described as) alienation between publics and expert-led political institutions—more profound than its typical description as mistrust.

■ CONCLUSIONS: FRAMING RISKS AND ETHICS

This essay deeply criticizes the ways in which contemporary policy culture conceptualizes and handles public policy on GMOs, yet my main point is not at all against GMOs. Rather, it is against the current ways of promoting and regulating them. Its critical focus is the mode of contemporary policy culture, especially two linked aspects:

- the ways in which science has become the culture of policy rather than its key intellectual resource; and
- the corresponding implicit yet unaccountably normative representations of the public, and profound denials of responsibility, which this political culture involves.

It is imaginable that commercial GMOs—of a correspondingly different kind perhaps—could be developed under a different culture. Indeed, their future viability would require it, since the deeper cultural fabric of social relations in and around the science and technology of GMOs is profoundly inadequate and unsustainable. I have made such an argument at two distinct levels.

Firstly, more generally, I have argued that the policy discourses about risk and ethics of GMOs embody prior unacknowledged and thus unaccountable yet arbitrary human values and ethical commitments. These should be recognized as contingent human commitments, not imposed as truths which any rational person should respect. These human commitments are not deliberately concealed, but are culturally embodied, taken-for-granted habits and routines of thought and practice, the constitutive framework of deliberate analytical thinking rather than the focal objects of such rational examination.

They need to be rendered more explicit, and more open to public deliberation—as a democratic principle, and in order to save scientific culture from itself. Recognizing such buried and powerful values and ethical commitments does not have to abandon the processes of their public resolution to subjective anarchy. Values issues can be rationally debated even if not reduced to deterministic singular resolution.

Secondly, at a more specific level, I have argued that policy experts (including some social scientists) claim that particular discourses of risk and ethics on GMOs objectively represent public

concerns. Yet these discourses themselves suffer from the unrecognized cultural syndrome criticized above, and tacitly represent the public with some prior cultural presumptions about public meanings, scientific knowledge and about the public as human subjects, which are taken-for-granted, unaccountable, protected from falsification, and wholly inadequate. Moreover, these tacit representations protect scientific institutions from critical attention to the unrecognized cultural biases which they embody, project and reproduce in the name of rationality. Inevitably this gives science and rationality a bad name, because they are thus sensed to be concealing (and attempting to control) an extensive but inaccessible human political agenda. Thus even when they are explicitly referring to ethical concerns, they appear to be acting unethically.

As a further corollary of this analysis: from culturally entrenched ways of thought and institutional practice around government and science, as developed mainly since the mid-twentieth century, there is a need to dig out the implicit human values and ethical pre-commitments which those cultures (including scientific culture) unaccountably reproduce and impose. Our task is to render the very fabric of culture transparent and explicit, open to rational and reflexive public deliberation—a quintessentially modern project. By refusing to recognize this necessary project, the institutional policy culture obstructs modern democratic values, thus presenting a further set of ethical problems. Indeed, here a particularly pervasive and powerful modern culture perversely claims to have no culture.

☐ *Normative commitments*

I have stressed an unacknowledged implication in the dominant culture of policy discourse on GMOs and public concerns. This is that its fundamental framing of the issue—of public concerns and, through these, of the public—systematically evades attention to the inability of even the best scientific knowledge to identify the main consequences of our technological or scientific commitments. Scientific risk assessment alone cannot offer this degree of control.

Our society needs to move away from a normative assumption of control, instead stepping towards an explicit, inclusive and accountable reflection on the quality of the knowledges on which we depend. This reflexive capacity is woefully lacking in what remains a predom-

inantly pragmatic, empiricist intellectual and policy culture in the UK, and internationally too (though perhaps to a less marked degree). Perhaps the two most characteristic elements of the scientific culture in modern self-consciously rational policy are:

- its systematic assumptions of and claims for control (and the intimately related dependency of modern institutions on the claim of control as crucial to their political legitimation); and
- its systematic denial of this human predicament and the related denial of the cultural 'biases' and responsibilities which this brings.

This dogmatic cultural form unites a particular discourse of science and rationality with a corresponding implicit representation of the public and its concerns. One cannot study public concerns as most social science has done, as if they were about a supposed object like 'risk'. Rather, they are more authentically to be seen as concerns about that institutionalized culture of science and its tacit human implications. Treating them as if they were about risk (and now also 'ethics' as particularly defined) is to impose the same uncritically presumed, supposedly universal meaning on the public as that presumed by the dominant institutions.

According to my analysis the dominant discourse of public concerns—including the recently more influential ethical dimensions—habitually projects the public and its concerns as epistemically vacuous, thus of strictly limited status, and justifying strictly limited kinds of response on the part of the dominant institutions and their scientific culture. Risk assessment scientific knowledge is assumed to identify all the significant consequences, even if imprecisely so, and this is assumed objectively to frame the utilitarian element of ethical concerns, leaving only the deontological ethical questions. These are defined as purely private individual choices that can be freely made (with labelling) and fully resolved in the marketplace.

Thus risk and ethical concerns are absolutely differentiated. Risk knowledge is assumed to be unproblematic, and exaggerated claims made for its authority and reach, in terms of control over consequences, are assumed to bear no collective public ethical implications. No ethical questions are recognized relating to official institutional claims about the quality of that scientific knowledge, and about the tacit representations of the public in these claims. Yet this is precisely where public concern appears to bite most intensely.

It could be better described as intellectually founded moral outrage at these implicit misrepresentations, rather than the (misplaced) 'fear' that it is often said to be.

These limitations in the institutional cultural constructions of the public and its concerns therefore delete any need for self-reflexive critical examination of framing assumptions and contingencies on the part of the dominant institutional culture. These are arbitrary, deeply inadequate and damaging visions of the human which shape the scientific culture; these visions cannot be excused as if they were only provisional assumptions being deliberately tested in the public arena and open to revision in the light of possible 'public refutation'. Such an optimistic Popperian model neglects the deeply entrenched and even perhaps unconscious cultural way in which such commitments shape explicit 'rational' thought in this context.

For this reason I have also stressed that the syndrome which I criticize should be understood as a cultural syndrome. It is constitutive of habitual, unquestioned ways of thought and practice—implicitly shaping what counts as reason, rather than resulting from deliberate reason. This cultural character is what makes it so extraordinarily difficult to point out to its agents, and for them to recognize themselves as such.

Deleting public concerns

My emphasis on the unrecognized pervasive importance of the unknowns which always lurk beneath any commitment, and behind any scientific risk assessment, can of course be countered by the response that there is nothing special about GMOs in this respect. But this argument avoids the basic point that the public's typical concerns combine the following:

- an intellectual judgement on the institutional scientific denial of this endemic limitation of scientific knowledge; with
 - a moral, intellectual and political judgement of the available science as 'captured' by commercial and other politically 'interested' forces, a sense which has been dramatically exacerbated by the deliberately cultivated commercialization culture which has pervaded even academic science in the last decade or more; and
 - a correspondingly greater need for public accountability and debate over the human purposes, aspirations and forces driving
-

scientific research for *innovation* in this domain—yet the obstruction of such accountability by a dominant discourse focusing on ‘objective’ risks and benefits, and now ethics too (as constructed in the false way described here).

This public experience of the dominant institutional culture creates not just public opposition to GMOs, but more seriously still, alienation from the institutions supposedly taking responsibility for them. Yet the lines of accountability for this more general deterioration of public policy culture may never be recognized, because they are too entangled and indirect.

In the supposedly open-minded reports analysed in this essay, there is no recognition of the crucial need for open inclusive reflection and deliberation on the quality of the knowledges on which we rely for policy commitment. In this respect, these reports and their patrons are part of the same institutional culture which is at least as much the cause of public concerns as the ‘risks’ or the ‘playing God’ dimensions themselves. Indeed this could be redefined as an existential human risk which arises from the public’s sense of its unavoidable dependency on such an insensitive, unaccountable and alienating institutional culture.

I have described how ‘ethical’ dimensions of public concern are accepted as legitimate, but only by assuming them to be of a particular emotional, ‘touchy-feely’ kind. This framework represents public concerns in a way which can be digested and uncritically domesticated within the terms of the existing institutional culture. It evacuates their substantive content, e.g. the lack of intellectual control (predictive ability) of science which gives rise to unanticipated consequences. These limits of predictability are excluded or misrepresented as a tractable and bounded imprecision.

In this way, public concerns about the purposes, driving forces and conditions of innovation research can be deleted and misunderstood instead as exaggerated and irrational concerns about ‘too much’ uncertainty or risk. Yet these concerns reflect a mature appreciation of the rational need to ask, ‘Why are we unleashing those possible unknowns? Is there good reason?’, precisely because they know that there is an endemic lack of predictive control over consequences.

Thus it can be seen as all-the-more grotesque when the public’s

concerns are treated as a naive 'demand for zero uncertainty', when they actually recognize a more radical uncertainty (indeed indeterminacy) than that admitted by science.

□ *Testing unknowns?*

The former UK government Chief Scientific Adviser and a central figure in the public policy debate over GMOs, Robert May, has explicitly recognized in principle the endemic existence of unknowns (May, 1999). This acknowledgement would appear to contradict my assertion that institutional science reduces uncertainty to only known uncertainties, such as imprecision in salient variables. However this appearance would be mistaken, since May soon reverts to defining these uncertainties as tractable to testing. Indeed, he says this is being done for GMOs, when it was not for BSE; hence we can be reassured by the learning process underway.

However, this authoritative characterization of the issue begs the very question of how we know what uncertainties we should be testing for. According to the Chief Scientific Adviser, BSE and its human form 'arose as an unintended consequence of changing agricultural practice, arguably without sufficiently wide-ranging consultation about the possible consequences'. As a result, he claims,

Lessons have been learned ... And we must test. No-one was looking out for untoward effects in cattle. In the case of GM food we are testing for unexpected and unwanted effects on human health and on the environment (May, 1999, p. 3).

When he suggests that we could and should have been testing for untoward effects, his reassurance ignores the fact that we did not even know about the existence of prions in the BSE case; nor do we still know their role and behaviour. Thus to say that testing will provide control, when technological processes can involve things which we may not even know about, inadequately represents the problem. Of course testing of as much as possible should be done, but May confuses and subsumes the more serious predicament of ignorance with the scientifically tractable problem of known uncertainties. It also thereby continues effectively to deny responsibility for the difficult reality of unanticipated consequences, a traditional

cultural stance which is just what needs to be recognized and re-thought.

By resorting to the reassurance of 'testing', moreover, May ignores the similar issue for GMOs. That the farm-scale testing now being done not only may not answer the salient questions, but was also not anyway a lesson learned from the disastrous handling of the BSE issue. The farm-scale trials programme was only later forced on policymakers and advisers by the combined lobbying of English Nature and protest by environmental NGOs. May invokes such testing as an adequate solution to the more searching challenges posed by the predicament of scientific ignorance and unpredictability. Yet these hastily devised and reluctantly initiated farm-scale tests for environmental effects of GM crops exclude key scientific questions—for example, about soil microbiota and biodiversity—as intractable, thus still unpredictable. The report of the Agriculture and Environment Biotechnology Commission underlies this print (AEBC, 2001).

Creating public alienation

Official institutions continue to blame public ignorance of science for public opposition to GMOs, in so far as the public allegedly demands certainty in these matters and does not understand that science cannot provide it. My understanding of public experience of these issues is almost diametrically opposite: that the public sees science expressing only denial of its intrinsic lack of control as manifested in the endemic predicament of unanticipated consequences, a predicament which the public typically takes for granted. Thus public opposition and mistrust is encouraged by the attempts of institutional science to exaggerate its intellectual control. The type of uncertainty to which science limits its focus is a more limited form of known uncertainty—such as imprecision—rather than ignorance.

Ultimately the failure of scientifically enculturated policy institutions to command public confidence and trust is based in their incapacity to recognize their own cultural commitments and unaccountable normative human visions, as if these were non-negotiable declamatory revelations. This incapacity cripples the potential for a more mature and expansive political, cultural and scientific agenda. Such an agenda is most starkly needed where dominant institutional

presumptions about the meaning of risk and ethics are simply imposed, as if they were universal and objective. Moreover and even more perversely, these self-referential parochial cultural circuits are then reinforced when the public tries to challenge those presumed and imposed meanings: that public divergence is assumed to be a misunderstanding of factors from within this institutionally assumed meaning-frame, rather than an attempt to express and establish *different* frames of public meaning.

As the most important conclusion, I wish to suggest that public concerns—and what are misleadingly called ‘risk-perceptions’, whether of GMOs or of any other technological domain—cannot be objectified and studied as if they are distinct from the ways in which relevant scientific and policy institutions behave, including how these bodies articulate dominant discourses of the issues. These ‘rational’ discourses tacitly embody (and project onto society) powerful models as prescriptive ontologies of human relations, human subjects and society. By definition, these are not perceptible to solely evidence-based observation.

Therefore their authors (and others who attempt to analyse these models) have a hitherto unrecognized responsibility to become aware of these unstated dimensions of both scientific discourses of the issues and public expressions of concern. After this responsibility goes a further one: ensuring that these deeply embedded and disavowed human commitments are rendered more accountable to wider deliberation.

■ ACKNOWLEDGEMENTS

I would like to thank all my colleagues in the EU PABE project for their invaluable contributions to the sustained intellectual discussions which informed both the project and my thinking on this essay. Earlier versions greatly benefited from presentation and critical discussion at the Society for the Social Studies of Science (4S) and European Association for the Study of Science and Technology (EASST) joint annual meeting in Vienna, September 2000, and to seminars at Politeia, Milan, October 2000 and the University of Trieste, October 2000. The further inputs of Ulrike Felt, Tina Thiel, Sheila Jasanoff, Ruth Chadwick, Bron Szerszynski, Robin Grove-White and Sarah Franklin were especially helpful. Remaining problems are of course my own responsibility.

□ REFERENCES

- AEBC (2001) *Crops on Trial*. London: Agriculture and Environment Biotechnology Commission, September 2001.
- BEPCAG [Biotechnology and the European Public Concerted Action Group (J. Durant coordinator)] (1997) 'Europe ambivalent on biotechnology', *Nature*, 387: 845–847.
- CEC (2000) DG Research and Joint Research Centres, Commission of the European Communities, Conference on Science and Governance, Brussels, October 2000. Introductory statement, <http://www.jrc.es/sci-gov>.
- CSEC (2000) 'Public attitudes towards agricultural biotechnologies in Europe', final report of project with five partner country teams (Spain, Italy, Germany, France and the UK), funded by EU, DG-Research, Brussels, December 2000. Coordinated by B. Wynne and P. Simmons, Centre for the Study of Environmental Change (CSEC), Lancaster University.
- CSEC-Green Alliance (1996) 'Uncertainty, Precaution and Decision-Making: The Release of GMOs', Global Environment Change Briefings, number 8, webpage <http://www.sussex.ac.uk/Units/gec>, <http://www.gn.apc.org/gralliance>
- Cvetkovich, G. and Lofstedt, R. (Eds) (1999) *Social Trust and the Management of Risk*. London: Earthscan.
- Dillon, M. (1995) 'Sovereignty and governmentality: from the problematics of the "New World Order" to the ethical problematic of the World Order', *Alternatives*, 20: 323–368.
- European Federation of Biotechnology (1999) *Ethical Aspects of Agricultural Biotechnology*, report by Task Group on Public Perceptions, The Hague, Netherlands.
- Food Ethics Council (1999) *Novel Foods: Beyond Nuffield*, second report. Southwell, Notts: Food Ethics Council, www.users.globalnet.co.uk/~foodeth.
- Gaskell, G. *et al.* (2000) 'Biotechnology and the European public', *Nature Biotechnology*, 18(9): 935–938.
- Grove-White, R., Macnaghten, P., Mayer, S. and Wynne, B. (1997) *Uncertain World*. Lancaster: Centre for the Study of Environmental Change.
- Grove-White, R., Wynne, B. and Macnaghten, P. (2001) *Wising Up*. Lancaster: CSEC.
- Hornig Priest, Susanna (1999) 'Popular beliefs, media and biotechnology', in S. Freidmann, S. Dunwoody and C. Rogers (Eds), *Communicating Uncertainty: Media Coverage of New and Controversial Science*, pp. 95–112. Mahwah, NJ and London: Lawrence Erlbaum.
- INRA (2000) 'The Europeans and Biotechnology', Eurobarometer report by INRA (Europe)-ECOSA, for EU. Brussels: DG Research.
- Irwin, A. and Wynne, B. (Eds) (1996) *Misunderstanding Science? The Public Reconstruction of Science and Technology*. Cambridge and New York: Cambridge University Press.
- Krimsky, S. and Golding, D. (Eds) (1992) *Social Theories of Risk*. New York: Praeger.
- Levidow, L. and Carr, S. (1997) 'How biotechnology regulation sets a risk/ethics boundary', *Agriculture and Human Values*, 14: 29–43.

- Levidow, L., Carr, S., von Schomberg, R. and Wield, D. (1996) 'Regulating agricultural biotechnology in Europe', *Science and Public Policy*, 23(3): 135–157.
- Levy, A. and Derby, B. (2000) 'Report on Consumer Focus Groups on Biotechnology', U.S. Food and Drug Administration, Washington, D.C., October, 2000.
- Louet, S. (2001) 'EC study reveals an informed public', *Nature Biotechnology*, 19(1): 15–16.
- Martin, S. and Tait, J. (1992) *Public Perceptions of Genetically Modified Organisms*. London: Department of Trade and Industry.
- May, R. (1999) *Genetically Modified Foods: Facts, Worries, Policies and Public Confidence*. London: UK Department of Trade and Industry, Office of Science and Technology, www.dti.gov.uk/ost.
- May, R. (2000) *Guidelines 2000: Scientific Advice and Policy Making*. London: UK Department of Trade and Industry, Office of Science and Technology, www.dti.gov.uk/ost.
- Novo-Nordisk (1997) *Corporate Annual Environment and Bioethics Report*. Copenhagen: Novo-Nordisk.
- Nuffield Council for Bioethics (1999) *Genetically Modified Crops: the Ethical and Social Issues*. London: Nuffield Council on Bioethics, <www.nuffieldfoundation.org>.
- Rowe, G. and Frewer, L. (2000) 'Public participation methods: a framework for evaluation', *Science Technology and Human Values*, 25(1): 3–29.
- Slovic, P. (1992) 'Reflections on the psychometric paradigm', in S. Krimsky and D. Golding (Eds), *Social Theories of Risk*, pp. 78–92. New York: Praeger.
- UK BBSRC (1996) *Ethics, Morality and Crop Biotechnology*, by R. Straughan and M. Reiss for Biotechnology and Biosciences Research Council. London: UK Department of Trade and Industry.
- UK House of Lords (2000) *Science and Society*, Report of the Select Committee on Science and Technology, March 2000 (Lord Jenkin, Chair).
- Warner, F. (1981) 'Foreword: the foundations of risk assessment', in R. Griffiths (Ed.), *Dealing With Risk*, pp. ix–xxii. Manchester: Manchester University Press.
- Wynne, B. (1980) 'Risk, technology and trust: on the social treatment of uncertainty', in J. Conrad (Ed.), *Society, Technology and Risk*, pp. 83–117. London: Arnold.
- Wynne, B. (1982) *Risk and Rationality: the Windscale Inquiry and Nuclear Decisions in Britain*. Bucks, UK: British Society for the History of Science.
- Wynne, B. (1987) *Risk Management and Hazardous Wastes: Implementation and the Dialectics of Credibility*, especially chapter 11. London and Berlin: Springer.
- Wynne, B. (1989) 'Frameworks of rationality in risk management: towards the testing of naïve sociology', in J. Brown (Ed.), *Environmental Threats*, pp. 93–110. London: Frances Pinter.
- Wynne, B. (1991) 'Knowledges in context', *Science Technology and Human Values*, 16(1): 1–21.
-