# Governing the moral economy: animal engineering, ethics and the liberal government of science

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**Abstract**

The preferred Western model for science governance has come to involve attending to the perspectives of the public. In practice, however, this model has been criticised for failing to promote democracy along participatory lines. We argue that contemporary approaches to science policy making demonstrate less the failure of democracy and more the success of liberal modes of government in adapting to meet new governance challenges. Using a case study of UK policy debates on scientific work mixing human and animal biological material, we show first how a 'moral economy' is brought into being as a regulatory domain and second how this domain is governed to align cultural with scientific values. Through these practices, the enhancement of individual and collective prosperity through technological advance is ensured.

**Keywords:** Science governance, bioethics, liberalism, moral economy, human/animal mixing

> Science is too important to be left only to scientists. Their knowledge, and their assessment of risks, is only one dimension of the challenge for society. When science raises profound ethical and social issues, the whole of society needs to take part in the debate. (DTI, 2000: 54)

The above quotation from the Department of Trade and Industry White Paper *Excellence and Opportunity: a science and innovation policy for the 21st century* reflects and reinforces recent approaches to science governance in the UK and elsewhere. In the wake of very public controversies over science in the 1980s and 90s, notably the response to genetically modified (GM) crops and the bovine spongiform encephalopathy (BSE) crisis, the preferred Western model for good science policy making no longer relies exclusively on expert advisory committees but instead includes attendance to the perspectives of the public. This model has been given intellectual foundations by work in the sociology of science and normative credentials by the promotion of deliberative models of democracy. The way that the model has been put into practice in science governance has, however, been criticised for neglecting the promotion of democracy along participatory lines. This paper argues that contemporary approaches to science governance demonstrate less the failure of democracy, and more the success of liberal modes of government in adapting to meet new governance challenges.

The way that states operate to produce a moral economy that allows the trading of values between nations as a means to meet 'the political need to reconcile the promise of new health technologies with the cultural costs of scientific advance' (Salter & Salter, 2007: 555), has been studied in relation to the politics of human embryonic stem cell science (Salter, 2007; Salter & Salter, 2007). In this paper, our focus is on the government of the moral economy of science within the nation state: how is this domain defined, regulated and managed? How are the diverse value positions circulating within the jurisdiction of the state configured as legal or illegal tender, how is the exchange rate for trading different values set, and how are the value preferences of consumers

shaped so that satisfaction of their preferences by the individual also enhances the prosperity of the state?

The analysis is developed using material drawn from policy debates on the scientific engineering of mixed animal-human biological material: specifically the examples of genetically modified animals and chimeric embryos. Genetic modification involves the introduction of human genes into animals, a practice that is carried out for research into human disease (e.g. putting human cancer genes into mice in order to study the development of the disease) and, potentially, therapy (producing human proteins for therapeutic use from human genes inserted into animals).[1] Chimeric, or interspecies, embryos are embryos produced by taking the nucleus (containing the genetic material) from a human cell and introducing it into an animal oocyte from which the nuclear material has been removed, using the technique of Somatic Cell Nuclear Transfer. The production of such embryos was proposed by scientists as an alternative to the use of human embryos as a source of stem cell material for research.

Genetic modification of animals assumed policy prominence in the early years of this century with the debate having its origin in the controversy surrounding genetically modified crops. As one report made explicit 'Government and the livestock industry must get it right, to avoid the problems we have seen with public acceptance of the introduction of GM crops and food' (AEBC, 2002: 4). The policy discussion of chimeric embryos, which evolved in the latter part of the century's first decade, had as its lineage the fierce debates over human embryonic stem cell science, which itself is part of a wider history of debate about early human life (assisted reproductive technologies (ART), pre-implantation genetic diagnosis (PGD) and, most notably, abortion). Debates involved parliamentary bodies (e.g. the House of Commons Science and Technology Committee report on *Government proposals for the regulation of hybrid and chimera embryos* (House of Commons Science and Technology Committee, 2007)), governmental advisory bodies (e.g. the Agriculture and Environment Biotechnology Commission report on *Animal and Biotechnology* (AEBC, 2002)), non-governmental organisations (e.g. the Animal Procedures Committee *Report on Biotechnology*

(APC, 2001)), independent regulators (e.g. the Human Fertilisation and Embryology Authority consultation on *Hybrids and Chimeras* (HFEA, 2007), and independent organisations feeding into policy (e.g. the Academy of Medical Sciences report on *Interspecies embryos* (AMS, 2007) or the Royal Society report on *Use of Genetically Modified Animals* (Royal Society, 2001)). In this sense, the material informing this paper encompasses both 'public' and 'private' policy (Bonnicksen, 2009: 10).

Significantly, the debates on genetically modified animals and chimeric embryos were both initiated by policy bodies in the absence of any salient public controversy (though emerging from related issues that were contentious). While genetic modification of animals and production of chimeric embryos clearly had the potential to develop a contentious dimension, engagement of policy networks with these potential issues can be seen as a form of anticipatory governance designed to avert conflict (authors). Thus far, this strategy has proved successful and to that extent the debates are particularly informative because, it is argued, they are examples of liberal modes of governance that enable the moral economy to work efficiently in support of scientific advance.

**The moral economy: ethics and the liberal government of science**

In activities addressing the relationship between science and the public, a model of 'public understanding' has given way to one of 'public engagement'. Approaches adopting the 'public understanding' model were premised on a view of the public as lacking requisite understanding of science, such that disputes could be alleviated through education (The Royal Society, 1985: 10): once the public has a proper (scientific) understanding of the objective reality, they will come to the same, rational, viewpoint as the experts. This 'deficit model' was much criticised by sociologists of science, who argued that all knowledge is situated, perspectival and contingent (e.g Irwin, 1995; Irwin & Wynne, 1996; Jasanoff, 2005). Such claims for the symmetry of knowledge were used to support arguments that 'lay expertise' be brought into policy making on an equal footing with the

expertise of scientific authorities. The means to resolve tensions, in this case, is considered to be not education of the (deficient) public, but engaging the (expert) public in dialogue with other experts so that a consensus can be achieved.

The 'dialogic turn' (Irwin & Michael, 2003: x) in public understanding of science resonates positively with the wider 'deliberative turn' in democratic modes of governance. As such, it is unsurprising that engagement of the public in dialogue over science has been readily taken up by governments as a necessary component of the policy process designed to ensure the legitimacy of the policy outputs. Initiatives such as consensus conferences, citizens' juries, and public debates such as the *GM Nation?* debate have become a recognised part of the policy landscape. Some form of public engagement exercise has become *de rigueur* for bodies producing reports on scientific developments intended to feed into policy-making. Such initiatives also speak to the liberal valorisation of individual freedoms. The state, in contemporary liberal thought, should not impose its conception of the good on its citizens; rather, its role is to uphold the rights of individuals to make their own choices as to what the good life consists of (Rawls, 1999 [1971]). In the practice of government, the role of the state goes beyond upholding rights to include ensuring that the proper procedures are in place for citizens to express those rights through their individual choices (Sandel, 1984).

It is here that the approach to the analysis of liberal government introduced by Foucault and developed by others becomes fruitful. Liberalism, in this analysis, 'is not so much a substantive doctrine of how to govern. Rather, it is an art of governing that arises as a critique of excessive government' (Rose *et al.*, 2006: 84). Analysing liberalism as an art of governing focuses attention on its practices. Government, here, is not synonymous with a centralized state power. Rather, it is rather an activity that is carried out in a diverse range of locations under the aegis of various authorities. It may involve direct action by the state but increasingly it is a practice of 'governing at a distance' (Rose & Miller, 1992: 181), a practice in which expertise plays a central role (Miller & Rose, 1990; Rose & Miller, 1992; Rose, 1993). The activities of governing take place within the

context of a particular political rationality; that is, a particular way of knowing that shapes what is constituted as a problem requiring the actions of government and what is considered a valid and proper way of addressing that problem. But government is, intrinsically, technical, for while 'political rationalities render reality into the domain of thought' it is the technologies of government that 'seek to translate thought into the domain of reality, and to establish "in the world of persons and things" spaces and devices for acting upon those entities of which they dream and scheme' (Miller & Rose, 1990: 8; see also Dean, 1996b: 52).

Liberal government, arising as it does as a critique of excessive government, is characterised by a reflexivity on the part of the state, a constant questioning of the proper limits of its activity. This is not a striving to minimise government *per se*, but a concern that the state might be doing too much of the governing (Dean, 2002: 41), encroaching into the domains of governance that exist outside the apparatuses of the state and operate according to their own heterogeneous systems of regulation. The archetypal such independent regulatory system is the economy. In Foucault's analysis, liberal government takes shape with the emergence in political thought of 'the economy', a domain operating according to fundamental natural laws, as an autonomous sphere of rationality operating outside the juridical domain of the state (Gordon, 1991: 11). While operating autonomously from the state, the state, in classic liberal thought, retains a vital role in ensuring that this domain of the economy can operate freely: its role is 'to create regulations that enable natural regulations to work' (Foucault, 2007: 353). More recent neo-liberal political thought conceives of a more intimate role for the state in the government of the economy. Foucault's understanding, the key difference between classic and neo-liberal rationalities of government is that while the former sees the market as a 'quasi-natural reality' that delimits a sphere in which government cannot act, for the latter the market is only maintained by the actions of government (Gordon, 1991: 41). The subject of rule is no longer *Homo economicus* who, following his private interests, is the sole and inviolable source of authority in the economic realm, but 'manipulable man' (Gordon, 1991: 43)

who must be acted on by government to make him properly competitive in the market (Burchell, 1996: 23-24; Rose, 1999: 144).

Contemporary (neo) liberal government takes an active role in shaping the economic realm. In classical liberal thought, the 'invisible hand' of the market would work to ensure that the wellbeing of the collective was increased through the actions of individuals seeking to optimise their own wellbeing. In neo-liberal thought, proper government is required to ensure the co-development of individual and collective wellbeing. Government, then acts in the name of individual and national prosperity (Rose, 1996: 53), and it is through ensuring national prosperity that the security of the state is guaranteed. Liberal government is not concerned with the direct legitimation of political power over a territory, the aim of sovereign rule exemplified by Machiavelli's Prince. Instead, it is concerned with ensuring the security (as in prosperity) of its people so that this prosperity is not only the State's *raison d'être* but also the route by which it can ensure its continued existence (Gordon, 1991: 19; Foucault, 2000a: 322). Political legitimacy is thus achieved at one stage removed, but the operation of power is present and constant.

A key measure of prosperity for contemporary states is their technological capacity (Barry, 2001). Technological capacity is linked in reciprocal arrangements with other, older, measures of prosperity: health and economic value. Scientific and technological advance is a means to improved health, and an opportunity to increase economic advantage; increased economic capacity allows investment in science research and development and in measures to improve health; improved health reduces welfare dependency and so improves the economic position of individuals and the state, and impacts on the enhancement of technological capacity, good health being a prerequisite for engaging in practices of knowledge generation and skill development. They are also both individual and collective goods: generation of new scientific knowledge and new technological skills is advantageous for the nation and also for those individuals who come to possess these faculties and who command a premium in employment; economic benefits will accrue both to

individual citizens and to the national economy in the form of increased competitiveness; health improvements increase the wellbeing of individuals and collectively of the population.

The aims of governing to increase prosperity are thus threefold, but science is a key *generator* of this prosperity, and an essential task of government is thus to ensure that science can proceed. A governance problem emerges when cultural values clash, or potentially clash, with values supportive of the science such as "population health gain", "economic competitiveness" and "scientific progress" (Salter & Salter, 2007: 555), so threatening to derail the smooth development of the scientific enterprise. If the moral economy is thus destabilised then so also is the project of constantly increasing wealth. How can liberal government make sure that science proceeds unimpeded (hence ensuring the prosperity of the state and its people) without governing too much – without imposing unwarranted restrictions on the right of individuals to hold to their own moral beliefs and hence follow their own conceptions of the good? In what follows, we show how liberal government institutes as a separate problem space for negotiating the clash between scientific and cultural values, outside the realm of the state, and how, adopting neo-liberal governmental practices, it governs this problem space to ensure that support of science is maintained. This problem space is the 'moral economy' of science.

**Constituting the legitimate elements of the moral economy**

If the moral economy is to work efficiently as a sphere of private governance distinct from public governance through state institutions, there has to be an understanding of what value conflicts should be situated in which domain. Government through the moral economy must therefore have the ability to allocate ethical issues accordingly and to be seen as acting legitimately in so doing. So for example, the Animal Procedures Committee report on animal biotechnology examines the ethical issues associated with mixing between species, particularly mixing between human and non-human animal, to create hybrid entities. It notes 'the main opposition to

hybridisation probably comes from those who wish to maintain real boundaries between human and non-human, and who retain a conviction that "kinds" are separate creations, each - as it were - designed to embody a particular beautiful form'. It then goes on to state 'It is no part of our brief to take sides on so large a metaphysical and ethical dispute' (APC, 2001: 11). Such positioning of the problematic question of the 'naturalness' of interspecies animals as one that a publically funded body should not try and answer parallels the assertion of the Nuffield Council on Bioethics report on the ethical issues of genetically modified crops, which recognised that 'some perceive GM crops as 'unnatural' and those who disapprove of their development and use for this reason are among the strongest critics of GM crops' (NCoB, 1999: 7) but asserts that 'the decision about what is unnatural cannot be one for public policy' (NCoB, 1999: 17).

Positioning the question of whether genetic modification is morally wrong because it infringes a 'natural' order (whether that order is one designed by God or by Mother Nature) as 'not one for public policy' is a classical liberal approach (Weale, 2001: 418). Contemporary liberal politics holds to the principle that the state should remain neutral on moral matters. Embedded in Kantian philosophy, and articulated most notably by John Rawls (Rawls, 1993, 1999 [1971]), the contemporary liberal position is that 'society is best arranged when it is governed by principles that do not presuppose any particular conception of the good, for any other arrangement would fail to respect persons as beings capable of choice; it would treat them as objects rather than subjects, as means rather than ends in themselves' (Sandel, 1998:10). As such, 'government should be neutral among competing conceptions of the good life' (Sandel, 1998:185); its role is to protect the rights of individuals to make their own choices as to the good. Far from marginalising such moral questions, positioning them as matters for individuals not the state indicates the seriousness with which they are taken by the liberal project as matters that properly belong to the autonomous realm of the moral economy.

It is not just that the state should not interfere in such matters (it does not have the right to do so), but that it cannot interfere – it does not have the technical knowledge to do so (cf. Burchell,

1991: 137-138). The report on use of transgenic animals in the EU produced by the European Centre for the Validation of Alternative Methods (ECVAM) describes how:

> Other key ethical concepts about which the general public and scientists often disagree are 'naturalness', 'integrity' and 'intrinsic/inherent value'. Thus, while the public might perceive animals as linking humanity to nature, some scientists may tend to consider laboratory animals as tools to manipulate and exploit. [...] These differences in values, views and lifestyles can be said to constitute different .world views. Clearly, there is no right or wrong position concerning these world views. (Mepham et al., 1998: 33)

The moral economy, like the financial economy, operates according to a logic that cannot be known by the state and so in which it cannot directly intervene (Gordon, 1991: 15; cf Burchell, 1991: 126). The state cannot decide what is right or wrong in animal biotechnology, whether mixing between species is 'natural' or 'unnatural', whether it violates the integrity of the species being, the moral status of the animal, or human dignity, and hence cannot pronounce on whether it should be allowed or not. These are questions that must be debated and decided outside the state's formal governance structures, within the realm of the moral economy.

However, to position the moral economy as an autonomous realm operating according to its own laws is not to say that the state abdicates responsibility for its operation. On the contrary, there is a requirement for the state to take an active role in ensuring that this domain is free to operate unimpeded (Foucault, 2007: 353). Value positions that challenge this principle must be managed (governed) accordingly. Those holding an anti-vivisectionist stance, for example, are managed in such a way that this perspective is devalued or excluded in debates on the use of animals in science. One strategy adopted for devaluing anti-vivisectionist perspectives is to neutralise them through co-option. For example, the NCoB working group on *Ethics of Research Involving Animals* included a representative of the British Union for the Abolition of Vivisection (BUAV), this representative being heavily outnumbered by representatives from science. An abolitionist perspective was thus given its due place under democratic principles, ethical issues debated and policy recommendations

formulated but the abolitionist perspective was not allowed to gain ground. Such a practice for 'incorporating and regulating the presence of the threatening Other within' allows the dominant discourse to 'manage the demands of marginal groups in ways that incorporate them without disturbing the hegemony of the norms that marginalize them' (Brown, 2008: 27, 36).

The hegemonic strategy of marginalisation through inclusion is complemented by a parallel strategy to deal with those who challenge the rules of the moral economy itself. Radical perspectives propounded by groups such as the Animal Liberation Front (ALF) are excluded – indeed, exclude themselves – from participation in the moral economy. For dealing with such groups, the state is likely to employ the authoritarian measures that are integral to liberal modes of government (Dean, 1996a, 2002; Valverde, 1996; Hindess, 2001). For the state, the ALF has de-legitimised its claims through its tactics of violence against property and people, so making itself a terrorist operation in the eyes of the policy community and most of the wider policy network. In its report on *Ethics of Research Involving Animals*, the independent Nuffield Council on Bioethics working group agreed with the state that 'use of violence and intimidation against members of the research community, research institutions, their business partners, family and neighbours, or against organisations and individuals representing animal welfare groups, is morally wrong and politically insidious' (NCoB, 2005: 264). By using tactics that are morally and legally wrong, the ALF places itself outside the moral economy and, in terms of a liberal democratic approach, excludes itself from the right to participate in the practices by which societal consensus is established according to democratic principles.

In the government of the moral economy, authoritarian measures are not only brought to bear to exclude those interest groups or individuals that 'disrupt or simply get in the way of the establishment and maintenance of a liberal legal and political order' (Dean, 2002: 40) – those who will not rather than cannot use reason. They are also applied to the moral arguments that might be enrolled, defining which are legitimate for use in the moral economy, and which are not permitted a place. In its structuring of the moral economy, the problem for the state is not the rational capacity

of individual citizens (or the lack thereof), but the definition of the proper and improper use of specific types of rationality in specific arenas of decision-making. As the policy discussion around animal engineering illustrates, the state is at pains to set the standard for the relationship between the formal rationality of the scientific domain and the operation of the moral economy:

> We recognise the sincere ethical and moral concerns associated with research of this nature and are therefore concerned that, to respond to these concerns, any regulatory framework associated with use of human-animal chimera or hybrid embryos in research should be transparent and workable. We have, however, been concerned to note that, in certain cases, the serious ethical and moral objections to work of this nature have been clouded through the raising of what appear at first sight to be scientific arguments to support such opposition but which do not stand up to scrutiny. Some of the opposition in responses which we received was based on hostility to science as against Nature. In addition, some throwaway statements concerning the scientific basis for proposed areas of research not only lack supporting evidence but may perhaps be better termed 'pseudo-science'. We are of the opinion that ethical and moral concerns should be considered within the context in which they are made, and that inappropriate use of science to justify ethical and moral arguments is unhelpful. Inappropriate use of science should be identified and disregarded by Government and other policy-makers. (House of Commons Science and Technology Committee, 2007: 26-27)

Establishing a linkage between the scientific and the moral domains so that the latter becomes dependent on the rational standards of the former is used as a basis for defining the boundaries of the state sponsored moral economy. Given that scientists and analytically-trained philosophers tend to dominate the working groups and committees producing policy-relevant material to inform debate in the moral economy of science, it is not surprising to find policy documents in which the only valid moral perspective is construed as the one that employs a narrow, technical or formal, rationality. For example, in the BBSRC's *Ethics, Morality and Animal Biotechnology* we find the view that 'ethical judgements may be argued for and shown to be more or less rational and informed' and that while consideration of moral concerns should be taken seriously, this is in order 'to raise the level of the debate and encourage judgements to be made on a rational and considered

basis' (BBSRC, 2000: 7). This is an articulation of the perspective that any controversy is a problem of insufficient information and poor reasoning: as Roger Straughan, author of the BBSRC report, has put it elsewhere, the arguments that genetic modification is unnatural because it crosses species boundaries 'do not have much ethical significance, resting as they do upon unclear language and unsound reasoning' (Reiss & Straughan, 1996: 64).

The appeal to facts, derived from empirical science, and to reason, the product of rational thought, as ultimate arbiters in moral debate has a privileged position in policy discourses. In this way the state acts to institute the moral economy as a regulatory domain that, once properly established, has the potential to operate according to its own logic, only requiring state support to ensure the proper rules for its operation are maintained. However, the extract from the House of Commons report on hybrid and chimeric embryos quoted above also suggests the emergence of a supplementary governance challenge for the state. While the report is at pains to distinguish between the scientific and the moral domains, the latter is seen as requiring serious attention in its own right. Following recent mutations in liberal modes of government, there is considered to be a proper role for the state in actively 'tinkering' with the ongoing operation of the moral economy to ensure that the desired ends of increased prosperity are met. We now turn to examine how the moral economy is made governable.

**Practices of governing the moral economy**

In its *Review of the cost-benefit assessment in the use of animals in research* the APC suggests that 'If people find the "mixing of kinds" objectionable, nobody concerned with public order, or the use of public funds, can disregard that objection merely because it seems, to some, unreasonable' (APC, 2001: 19). For contemporary liberal rationalities of government, such attention to a governable space can be seen as bi-directional: moral arguments are regarded as deserving of consideration by the political institutions of the state in the formation of science policy,

and this domain of the moral economy is requiring of government by the state in order to ensure it can operate effectively.

Central to the government of this space is the shaping of the ethical preferences of the 'consumer' in the moral economy. Engaging in dialogue with the public is viewed as a necessary part of good government in the formulation of policies on areas of emerging science. In the case of animal engineering, the AEBC underpinned its report on animal biotechnology with specially commissioned research into public attitudes (Macnaghten, 2001); the HFEA initiated a public consultation on public attitudes towards hybrid embryos in 2007 (HFEA, 2007); the House of Commons Science and Technology Committee drew on this research in its report on regulation of such embryos, and in addition held its own public seminar, noting 'This is the first occasion upon which we have held such an event and we found it to be of great value in our deliberations' (House of Commons Science and Technology Committee, 2007: 7). The AMS work on 'animals containing human material' includes 'a significant programme of public dialogue' (AMS, 2009a). But this dialogue must, from the perspective of contemporary liberal rationalities of rule, be so governed that the outcomes demanded of good government – an increase in welfare (health improvements, increased scientific knowledge, and enhanced economic competitiveness) – are assured. If, as a proponent of New Labour's policy of 'personalisation' has observed, 'a state that is committed to protecting private freedom must also continuously shape how people use their freedom in the name of the wider public good' (Leadbeater, 2004: 90), the modes of governance to achieve this happy condition are clearly central to the liberal project.

The earlier policy debate around plant genetic engineering illustrates how the state initially saw this task. For the Nuffield Council on Bioethics, members of the public were understood to have varying value positions with some regarding GM as 'unnatural'. These positions were treated as analogous to a consumer preference so that 'the freedom of choice of consumers must embrace the ability to refuse what they reject as "unnatural" products' (NCoB, 1999: 17). In other words, individuals should be able to act to satisfy their value preferences – in this case literally using the

(super) market as a means to do so. The state's role is to ensure that individuals have the freedom to so express their preferences, by, for example, instituting mandatory labelling of food products containing genetically modified ingredients. A similar stance towards food products derived from genetically altered animals was found in the policy discussion of animal biotechnology with policy makers recommending that 'arrangements should be made to maintain consumer choice about whether to purchase meat or other products from GM and cloned animals' (AEBC, 2002: 38)

The issues in animal biotechnology range much further than GM food products with GM animals being used, or potentially used, in a wide variety of ways. In these debates on genetic modification of animals, policy discussions correspondingly considered that attending to public concerns was a more complex matter. Considerable attention is paid in these discussions to research investigating the varied value positions held by the public, establishing that diverse, and often conflicting, moral stances exist. However, the difficult governance question is how to move from a knowledge of the diverse values circulating in the moral economy to the mechanism by which an agreement can be reached on which value positions should form the basis for public policy. There is no 'invisible hand' at work in the moral economy. Policy demand and value supply do not achieve a natural equilibrium. A plethora of new techniques for facilitating deliberative dialogue have been trialled: consensus conferences, citizens' juries, public debates, expert-led workshops and even the development of new 'games' by the New Economics Foundation that citizens can play 'in their own home, their local pub or a community centre' – since used by the Human Genetics Commission (New Economics Foundation, undated-b; Human Genetics Commission, 2003). These have, however, proved ineffective at producing a compromise agreement and certainly have not achieved consensus. The new tools of deliberative democracy have proved singularly unsuccessful in creating an ideal speech situation in which a communicative rationality can flourish. Instead, as with the *GM Nation?* Debate, interest groups with polarised positions have dominated despite avoidance of this phenomenon being an explicit aim of the exercise (Irwin, 2006: 311).

The new tools of deliberative democracy have been 'difficult to operationalize with any consistency and regarded with suspicion and hostility by the established culture of the UK's scientific and advisory system' as well as having the potential to politicize previously uninvolved constituencies and generate controversy where there was none before (Salter & Jones, 2005: 713). If the techniques of deliberative democracy are inadequate to the governance task posed by the moral economy, then other means must be sought. Given that expertise is integral to liberal modes of government being vital to the 'government at a distance' that is its key characteristic (Miller & Rose, 1990; Rose & Miller, 1992; Rose, 1993), the use of expertise as a means for filtering competing value positions is a natural governance path to explore.

In practices of government, experts are the link between 'socio-political objectives and the minutiae of daily existence' (Rose & Miller, 1992: 188). They are the pivot around which regimes of power/knowledge and regimes of subjectification are kept in articulation. In the government of values in bioscience and biomedicine, bioethical expertise, in the form of bioethics commissions, committees and the like, has come to have a central role (Salter, 2007; Salter & Salter, 2007), linking as it does the ethical stances of individuals developed within the moral economy with the moral imperatives of the state seeking to enhance its prosperity and the prosperity of its individual citizens. Bioethical expertise here is distinct from academic ethics, as a form of moral philosophy. It is 'public' (Kelly, 2003) or 'official' (Jasanoff, 2005: 173-188) bioethics. While both forms of ethics might be interested in the question of 'what should we do?', for academic ethics the aspiration is to arrive at a position of substantive moral agreement, whereas 'public bioethics' is interested in achieving a workable compromise, a consensus in the 'characteristically liberal sense of agreement on the legitimacy of certain procedures in the face of substantive disagreement' (Moore, 2010: 200). Bioethical expertise thus performs an interpretive function, its role being to 'translate statements made within one communally based tradition so that they can be understood within the system of knowledge based on another tradition' (Bauman, 1987: 5). As self-described

by one member of the bioethics community from the 'Center for Practical Bioethics' in Missouri, USA:

> The Center's role in these "cultural wars" is not to advocate for a particular position but to provide well researched and objective information, perspective, and advocacy for the ethical justification of policy positions; and to serve as a neutral convener and provider of a public forum for discussion. (Christopher, 2007: 28)

In similar vein, the Nuffield Council on Bioethics' first terms of reference is to 'identify and define ethical questions raised by recent advances in biological and medical research in order to respond to, and to anticipate, public concern' (NCoB, 2000: 5). While eschewing a normative role, bioethical expertise has a governmental role. It purifies the ethical discourses existent in society, reframing them in 'proper' language and addressing them using 'proper' techniques of evaluation (Moore, 2010). Notably, it reconfigures value disputes in ways that are amenable to formally rational debate and decision making (Evans, 2002). This does not mean that such bioethics ignores emotional responses to scientific developments among the public. Rather, it works to distinguish between public opinions with 'latent ethical potential' (Moore, 2010: 207), which can be developed into formally rational arguments that can engage with the moral economy and those founded on prejudice which are invalid currency and cannot.

The interpretive work that bioethical expertise undertakes is uni-directional. As a part of governmental practice it acts to translate the value claims of different interest groups into the hegemonic linguistic currency of the moral economy. The subaltern Other lacks a voice within the dominant system of knowledge/power (Spivak, 1988); this makes it a dangerously unpredictable, ungovernable entity. To be rendered governable it must be enabled by bioethics to speak with that system of knowledge/power but, inevitably, it will suffer a loss of meaning, and epistemic power, in translation.

In this way bioethical expertise acts as a mechanism for governing the moral economy when competing value currencies are in circulation. But where there is a potential ethical issue but not yet open controversy a further strategy is required to shape the emerging value preferences of consumers. In the case of GM crops a classical liberal approach saw resolution as a matter of individual consumers satisfying their (pre-existing) value preferences through the market. In contrast, in the anticipatory governance of animal engineering the state's approach is a neo-liberal one characterised by the active attempt to shape the moral economy through the promotion of certain value preferences over others. In the public engagement exercises undertaken to inform policy making on the topic of animal engineering, the provision of information on the science and its uses has been considered vital. For example, as a basis for its consultation on inter-species embryos, the HFEA produced a document 'which explained the science involved in creating different types of human-animal embryos for research. This document also explained some of the social and ethical arguments for and against the research' (HFEA, 2007: 4.5). This consultation document was considered necessary because 'a key aim of the consultation was to engage with the public in a meaningful way, informing the debate by ensuring that the public are aware of the various arguments for and against the creation of human-animal embryos' (HFEA, 2007: 4.12). The AMS, in its call for a contractor to carry out the public engagement element of its project on animals containing human material considered that it would be necessary for the contractor to provide participants with information such as 'what animals containing human material are; how animals containing human material are currently used in research; what scientific knowledge, and medical benefits, have resulted from such research; how animals containing human material might be used in future research, and what knowledge or medical benefits are anticipated; and what the possible risks to human health from such research might be' (AMS, 2009b: 8).

One could interpret this emphasis on providing information as a return to a deficit model of engagement, with education a necessary precondition for rational decision-making by the public. However, the consultations set out to do rather more than provide information, in terms of ensuring

that those taking part in discussion have the scientific literacy to understand what is involved in animal engineering. They also stress the importance of setting out the arguments for and against the science, as a prerequisite for 'meaningful engagement'. In this, the provision of information can be seen as part of a strategy for 'mobilising the consumer' (Miller & Rose, 1997) in the moral economy. Miller and Rose examined how the subject of consumption of consumer goods has been assembled by matching the desires of the individual with the outputs of the productive machine (Miller & Rose, 1997: 31). In the moral economy, governmental practices seek to match the ethical values of the individual with the outputs of the scientific machine. To paraphrase Miller and Rose (: 31): What is entailed is an unprecedented and meticulous charting of the minutiae of the moral passions using techniques such as in depth interviews, focus groups and workshops. This charting does not merely uncover pre-existing ethical positions: it forces them into existence by new experimental situations such as 'public engagement exercises' that enable them to be observed. It renders them thinkable by new techniques of calculation, classification and inscription such as the expert-led deliberative exercise and hence makes amenable to action and instrumentalisation in the service of the moral economy of science. The promotional gestation of ethical values in keeping with the values of the dominant scientific rationality can be seen in the public engagement work undertaken by the HFEA on hybrid and chimeric embryos, which prepares both 'the market for the product and the product for the market' (Thorpe & Gregory, 2010: 273). The HFEA exercise included 'deliberative work' in which 'expert speakers were used to illustrate the different issues and arguments relating to the consultation, thereby stimulating questions and debate' the aim being to 'explore how the views and opinions of participants changed when exposed to different information' (HFEA, 2007: 4.9). The provision of information by experts speaking to existing value positions is used to steer the value positions developed in members of the lay public.

Crucially, in the area of animal engineering there is an absence of any pre-existing ethical 'controversy'. As the AMS notes, there is an 'apparent gulf between current and future scientific practices, and public awareness' in this area (AMS, 2009b: 3) – or as the science journalist Mark

Henderson explained to the Joint Committee reviewing the Human Tissue and Embryos (Draft) Bill, 'there is no evidence for what the public thinks of this at all beyond the absence of a massive response and a massive postbag … which to me rather indicates indifference and perhaps a lack of really strongly held views' (quoted in Joint committee on the Human Tissue and Embryos (Draft) Bill, 2007: 13). Lay people enrolled into the various focus groups, interviews, panel discussions and so on do not come with deeply held beliefs as to the ethics of the science. As a result the task of governing is not to mediate between these beliefs, trying to find a resolution to the controversy that is acceptable to all. Instead, in a situation of 'anticipatory governance' the task is to deal with potential ethical issues.

Public engagement initiatives do not use tactics as crude as listing the potential ethical positions and enticing participants to choose from them. Rather, they identify areas of potential ethical tension that should be investigated. For example, the AMS indicated to those tendering for its public dialogue programme that areas to be explored might include 'where are particular sensitivities (e.g. around particular tissues - reproductive, or neural tissue; or species e.g. primates, domestic animals)' (AMS, 2009b: 9). In this way the debate is pre-framed in terms that have been set out by bioethical expertise which has highlighted these elements (mixing of brains, mixing between human and non-human primate, use of human embryonic stem cell derived material in animals) as of particular sensitivity (Greely, 2003; Greene *et al.*, 2005; Hyun *et al.*, 2007). Bioethical expertise is the authority that defines the debate, and hence policy, agenda.

In order to 'mobilise the consumer' through public engagement activities, an existing form of expertise, that of science, comes back into play and determines what information the public are given about the science. For example, the AMS emphasises that in its public dialogue exercise, 'The questions involved are to be refined by the Contractor in close consultation with the Working Group' (AMS, 2009b: 9) which is largely (though not exclusively) scientists. Combined scientific and ethical expertise is utilised in the dialogue activities as a way of 'stimulating debate'. For example, the HFEA consultation on hybrid and chimeric embryos employed workshops with

presentations by scientists and those speaking to different ethical stances, to 'enable participants to formulate a more informed viewpoint on the topic' (HFEA, 2007: appendix E, 2). In turn, the HFEA consultation took place against a backdrop in which scientists were active in advocating for interspecies research (Watts, 2009: 9), a tactic that resulted in the media reporting of the issue to be more in favour of the creation of interspecies embryos than against (Williams *et al.*, 2009). Within the ethical debate, language and concepts are configured to differentiate the morally unproblematic activities of science from the activities that are morally problematic: for example, the distinction between a blastocyst and an embryo, between sacrificing an animal in scientific research and killing it for other reasons, between genetic modification and genetic engineering.

Expertise plays a central role in acting on individual subjects to bring into being new ethical preferences. This ensures that the ethical stances that individuals come to hold on this issue do not conflict with values supportive of the science, values including "population health gain", "scientific progress", "economic competitiveness". The consultation exercises may be at pains to be neutral and even-handed in presenting information, offering arguments both for and against the science. But by invoking 'health' as an outcome of the science, they are tapping into the pre-existing moral discourse in which health is a meta-value the invoking of which legitimates other discourses and practices (Greco, 2004). Consultation exercises may list an equal number of pros and cons, but each point does not carry equal weight in the moral economy: an argument for the science justified in terms of health improvement is likely to outweigh several arguments against the science. As such, by suggesting that the science will satisfy the consumer preference for health (including setting out both the medical benefits that have arisen and those that are anticipated (AMS, 2009b: 8)), the articulation of value positions that speak against the science is forestalled and the bringing into being of those value positions supporting the science is facilitated.

## Conclusion

The way the UK debate over interspecies embryos was managed illustrates the success of liberal arts of government of the moral economy of animal engineering. The proposals by scientists to introduce human nuclear material into enucleated animal oocytes to create stem cells for research did not ignite pre-existing moral debates – other than to draw in those opposed to any form of embryo research (although these interspecies embryos do not use human embryonic material). Indeed, the main opposition to the research came from the Government of the day, which proposed fairly restrictive legislation, in part on the assumption that the public would be opposed to such technology, an assumption that one observer has described as being based on 'the findings of a flawed public consultation dominated by self-selecting opponents of embryo research' (Henderson, in Watts, 2009: 17). However, elsewhere in the machinery of the state, the stance was very much in favour of allowing the creation of interspecies embryos (House of Commons Science and Technology Committee, 2007; Joint committee on the Human Tissue and Embryos (Draft) Bill, 2007). With scientists proactive in promoting the potential benefits of the research in terms of human health, and the media on board, the value positions of the public could be brought into alignment with the demands of government. The consultation by the Human Fertilisation and Embryology Authority concluded that the majority of the public wanted to understand what was proposed and why scientists wanted to do it, and these people tended to shift from an instinctive 'yuck' response to acceptance or support of creating chimeric embyros (HFEA, 2007).

We should not neglect other facets of the government of interspecies embryos that pre-dated and preceded its government through the moral economy. It was only a chance remark by a scientist in a press conference that drew media attention to the possibility of this work being undertaken in UK research labs.[2] Without this inadvertent intervention, it is likely that the production of human/animal chimeric embryos would have been governed as a technical matter, within the existing policies and practices pertaining to the research. When the debate did emerge into the public domain, it was circumscribed by the authoritarian measures integral to liberal

government. Thus, when the HFEA consultation received a 'large number' of responses from those who were opposed to any type of embryo research, its approach was to 'distinguish those objecting to the fundamental notion of using human embryos in research, from other respondents, to explore where others might impose limits' (HFEA, 2007: 5.2), excluding the former from consideration.

In the matter of animal engineering, the debate is structured by bioethical expertise, regulating the currency of the moral economy, and the way the debate plays out is shaped by combined bioethical and scientific expertise, ensuring that the preferences of consumers in the moral economy are such that the satisfaction of these preferences by individuals also satisfies the aims of government. It is through the combination of these various elements of liberal government that the desires of the populace are brought into alignment with the will of the state. This is not an imposition by the state of its will on a populace against their interests for government is a form of pastoral power, a government of all and of each (Foucault, 2000a). Through these practices of government, the wellbeing of the individual is enhanced as the security of the state is increased. Animal engineering will improve both individual and population health, the knowledge generated is both an individual and a social good, and the economic benefits will accrue both to individual citizens and to the national economy in the form of increased competitiveness. Neither is it the meticulously ordered implementation of a centrally planned programme. The various activities of governing are 'more Heath Robinson than Audi, full of parts that come from elsewhere, strange couplings, chance relations, cogs and levers that don't work – and yet which "work" in the sense that they produce effects that have meaning and consequences for us' (Rose, 1996, p38). They have coherence within the context of a particular governmental rationality – a governmental rationality being the more or less coherent way of thinking about how government should be practised, on what or whom, by whom, and to what ends (Gordon, 1991, p3) – but they are not reducible to that rationality.

Analysing the government of animal engineering as a liberal practice allows for a more nuanced understanding than that developed in much social science analysis of science governance.

Social scientists have been disappointed with recent initiatives to develop science policy making so that it engages with the wider public, complaining that they have failed to be fully inclusive, engaging only a limited number of viewpoints, in a way that undermines any claims that the consensus reached is properly democratic (Irwin, 2001, 2006; Rowe et al., 2005; Horlick-Jones et al., 2006). This is not the failure of a democratic politics but the success of a liberal mentality of rule. Liberalism has demonstrated again its flexibility in adapting to meet new governance challenges, in this case the challenge of public opposition to science. Science may be too important to be left to the scientists, but it is also too important to be left to the public. The bringing into being of the moral economy and the development of techniques for governing that economy is proving effective in ensuring that the aims of enhancing individual and collective prosperity through enhanced technological capacity are assured.

[1] The production of human proteins in bacterial 'bioreactors' is well established: the first such product to reach the market was Eli Lilly's Humulin, human insulin, in 1982. The 'pharming' of therapeutic proteins in mammals has more recently been realised with the licensing of GTC Biotherapeutics 'ATryn®', a recombinant form of human antithrombin harvested from the milk of transgenic goats, in both the US and EU in 2006.

[2] The press conference was called by the Science Media Centre in the wake of the revelations of scientific fraud by the South Korean stem cell researcher Woo Suk Hwang. In response to a question about the problems of limited supply of human oocytes, Professor Chris Shaw explained that he was in the process of approaching the HFEA for a licence to work with animal eggs, generating something of a media furore (Fox, in Watts, 2009: 22).

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