The Sacred and the Profane:

biotechnology, rationality and public debate

Gail Davies
Department of Geography, UCL,
London, WC1H 0AP

phone: 020 7679 5557, fax: 020 7679 7565,
e-mail: gdavies@geog.ucl.ac.uk

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Abstract

This paper explores the forms of argumentation employed by participants in a recent public engagement processes in the UK around new technologies for organ transplantation, with specific reference to xenotransplantation and stem cell research. Two forms of reasoning recur throughout participants' deliberations that challenge specialist framing of this issue. Firstly, an often scatological humour and sense of the profane is evident in the ways participants discuss the bodily transformations that such technologies demand. Secondly, a sense of the sacred, that new biotechnologies are against nature or that commercial companies are 'playing god', is a repetitive and well-recognised concern. Such forms of reasoning are frequently dismissed by policy-makers as uninformed gut reactions. Yet they also form a significant part of the repertoire of scientists themselves as they proclaim the hope of new medical breakthroughs, or seek to reconstruct ideas of the body to facilitate new biotechnological transformations. Through questioning assumptions in Habermas's notion of discourse ethics, and exploring the importance of hybridity and corporeality as concepts in ethical thinking, the paper suggests that, far from being ill-formed opinions, such reasonings perform an important function for thinking through the ontological significance of the corporealisation of these proposed new forms of human and animal bodies.

Introduction

It is perhaps a truism to suggest that contemporary biotechnology is raising complex scientific, ethical and political questions that scientists, social scientists, industry and government are struggling to address, in ways that command public and stakeholder confidence. This, nevertheless, is the starting point for this paper, for many of these political questions remain unresolved and the means of addressing them under question. Despite the productivity of academic repertoires that question the geographies of biotechnology, through attention to the interplay of categories, agencies and bodies that constitute and locate biotechnology's hybrid geographies (Whatmore, 2002; Braun, 2004), the translation

of these insights and repertoires into contemporary arenas of political decision-making is more obscure. To attempt to do so is to raise a series of questions about what the operation of "an amodern politics of socionatural hybridity" (Castree 2003, p.209) might look like. Who or what might assemble the political claims for the quasi-objects of, for example, GM technologies? How might these claims be represented and warranted? And what new forms of political practice or norms of ethical engagement might legitimately distribute responsibilities for these entangled forms of life, amongst the increased number of actors recognised as having a stake in their future?

This renewed political terrain is the subject of the most recent work of Bruno Latour on the *Politics of Nature*. In this, he seeks to map out a set of new practices and institutions for reassembling political orders in ways that speak convincingly for these collectives, whilst removing recourse to the modernist categories of nature, fact or values (Latour 2004). The starting point for this paper is considerably more partial and modest – and a great deal messier – for it seeks to explore what happens when you take attentiveness to the heterogeneous construction of politics, science and nature into the empirical contexts of contemporary public debate around xenotransplantation and stem cell research. Both are a series of novel technologies that have been mobilised to speak to the shortage of human organs for transplantation: xenotransplantation through the genetic modification of pigs to engineer immunological compatibility between human and animal bodies, embryonic stem cell research through experimental techniques of therapeutic cloning to isolate and grow cells capable of repairing damaged organs. Both have also been the focus of considerable political innovation, as corporations and institutions seek to understand the implications for commerce and governance of the way these proposed scientific applications articulate with complex social and political contexts. In particular, there have been a number of experimental deliberative and inclusionary processes, which have sought to explore the wide range of citizen knowledges, values and experiences that pertain to the acceptability and uncertainty of these complex medical issues (Center for Technology Assessment 2001; Davies et al. 2003; Dutch Consumer & Biotechnology Foundation 2001; Einsiedel 2002).

This paper reflects on one of these processes - a participatory and deliberative form of multi-criteria appraisal called Deliberative Mapping (Davies et al 2003). Rather than standing back to redraw political and institutional landscapes around these amodern socio-technological entanglements, it seeks to explore the tensions and potential for openings that emerge in figuring them within current practices of democratic engagement with science. The paper takes up the call to 'hybrid geographers' to begin in the midst of things, to "attend to the middle – that place where everything happens, where everything picks up speed and

intensity" (Braun 2004, p.1354). It takes seriously the political spaces of deliberative democracy as places that have the potential to reconfigure the cartographies and capacities of both animal and human forms, yet which are inflected by existing institutional commitments to particular forms of humanist ontology and scientific epistemology. The paper is thus an exploratory mapping of the encounter between the modernist premises of the institutions and technologies of organ transplantation, the operation of political experimentation in deliberative processes and a sympathetic engagement with non-dualist forms of thinking around biotechnology.

This is introduced below through an exploration of the multiple forms of representation at work in the political processes of deliberative democracy. Three assumptions within the practices and critiques of deliberative democracy are unpacked for their productivity in opening up points of engagement between deliberative processes, political representation and the ontological commitments of biotechnology. Relational thinking around intersubjective corporeality troubles the notion of the individual subject assumed in both Habermasian ideals of deliberative democracy and in organ transplantation. Notions of hybridity recast questions about the validity and legitimacy of the representations of nonhuman actors within these political and scientific processes. Their articulation with other forms of media and political representations raises questions about the authority of the argumentative strategies in the statements of public meaning constructed through deliberative processes.

An exploratory mapping of participant discussions in the Deliberative Mapping process then brings to light a number of entities and modes of argumentation that inhabit these contested political, rhetorical and theoretical borderlands. In subsequent sections, I chart how profane knowledges emerge, mixing up ethical, political, and corporeal reasoning in often-grotesque talk about nature and bodies; these gut reactions transgressing the institutional division of labour of organ transplantation. Monstrous animals appear, marking responsibility for the shared corporeality of animal and human bodies, and concern for their difference, as well as bringing the trope of 'nature' back into debates over the geography of biotechnology (Castree 2004; Haraway 1991). Here and there, a sense of the sacred breaks through, in debates about whether the proponents of GM technologies might be 'playing god'. Whilst such 'irrational' discourses are frequently dismissed by scientists and politicians as issues of purely personal preference (see Wynne 2003), I explore how they also form a significant part of the repertoire of scientists themselves, as they proclaim the hope of new medical breakthroughs, or seek to reconstruct ideas of the body to facilitate biotechnological transformations. Within public debate, political institutions and academic interpretation, the

implications of contemporary biotechnology continue to transgress our categories and challenge our modes of argumentation, demanding renewed attention to modes of reasoning and new understandings of ontology. In concluding, I suggest we need to attend closely to these transgressive repertoires as performative categories through which the complex political and ethical implications of the networks supporting the hybrid entities of biotechnology are enlivened and given voice within primarily discursive processes. This refigures the aims of deliberative process, seeing them less as routes to consensus and more as processes through which actors may be able to immerse themselves in the worlds of others. Deliberation can be recast as part of the wider co-operative processes, through which modernist political institutions may be open to confrontation by the potentiality of non-dualist forms of reasoning, forging more ethical relations within the contemporary geography and politics of biotechnology.

Biotechnology, rationality and public debate

At the centre of contemporary debates around biotechnology are a set of questions about the relationship between different kinds of rationality, modes of reasoning and representational practices. Many proponents of deliberative democracy as a potential solution to disentangling and addressing these questions draw on Habermas's work on communicative rationality (Habermas 1984, 1987). Habermas's vision of a form of ethical dialogue that unfolds in an inclusive public sphere, able to confront the over-weaning power of instrumental rationality through deliberative processes, that are transparent to all participants, whilst being insulated from conflicts of power, is certainly powerful and appealing. It has informed a range of theoretical and methodological innovations, and it remains a powerful normative lens through which to interrogate engagements between science, society and political practice. Nevertheless, in application these normative assertions raise profound questions about the operation of rationality and ethical reasoning within deliberative processes. Critics of Habermas point to the assumption of a unified reason operating in argumentative strategies and deliberative spaces (Bohman 2000); the limited conceptualisation of the universal ethical subject apparent in discourse ethics (Gardiner 2004; Whatmore 1997); and the pervasive existence of power within the wider contexts to deliberation (Flyvberg 1998; Pellizzoni 2001). A further layer of complexity is added to these concerns by considering issues of representation. There are social scientific questions about the representativeness of the statements of public meaning generated through small-scale deliberative processes. There are normative queries about the political and ethical legitimacy of the authorisation of claims to speak on behalf of others in

deliberative contexts, and about whether the resulting representations are able to accurately reflect the interests of claimants (Braun & Disch 2002; O'Neill 2001).

The need for alternative modes of public deliberation, to explore the tensions between inter-subjective lifeworld practices and processes of scientific and technical rationalisation in contemporary biotechnology, remains acute. In a US case study on human genetic engineering, John Evans argues that the structure of public debate around biotechnology is increasingly thinned with the professionalisation of the legal, bioethical and regulatory actors in these debates (Evans 2002). He suggests repertoires of social conflict have moved away from messy, complex and unruly debates about the incommensurable ends of genetic medical interventions, which might have included arguments about delaying ageing, reducing suffering, perfecting the human species, modifying or maintaining social and natural orders. In their place, we have streamlined professionalized standards for evaluating biotechnological means – personalised informed consent, clinical efficacy and patient safety. The desirability of continually developing new medical technologies is now taken for granted, the end predefined to make arguments about means more calculable, less incommensurable. Increasingly, he suggests public debates are limited to languages of feasibility, efficiency, and cost effectiveness, which facilitate the reconciliation of corporate and technological power with the notion of individual personal freedoms (Kelly 2003). This normalisation of bioethical debate reflects a modernist emphasis on autonomy, independence and reasoning from abstract rules and principles, which often finds accords with narrow instrumental rationalities. Thus, there is a strong case for critical consideration of Habermas's alternative, evaluating the extent to which instrumental rationality may be confronted within deliberative processes conceived in this framework. Yet, whilst his analysis usefully illuminates the historicity of the forms and functions of the public sphere, the use of his work to derive a set of abstract universalised conventions to guide participatory processes is more problematic (Barnett, 2003, p. 60).

The first question is whether Habermas's concept of 'discourse ethics', to explain the principles that guide the construction of a social agreement on the norms of reasoning, is able to provide the counter to this asymmetrical operation of instrumental and substantive rationality. Habermas has argued that if instrumental reason is not to enjoy an unacceptably dominant status, one must explain how reasoning about norms and values is similar to reasoning about facts (Jaegar et al. 2001, p.239). This leads him to distinguish between three significant value spheres: science and technology, morality and law; and art and art criticism, which are oriented to three different worlds: the physical, the social and the personal (Habermas 1984, pp.163-165; 1987, pp.236-240). In discourse, he argues, people

relate to these worlds through speech acts, which have validity claims located within different spheres, thus speech acts claiming to characterise the material world reside in the sphere of science and technology, and are warranted through scientific epistemology. Scientific rationality must be developed, albeit at a pace that matches growth in practical and aesthetic rationality. Habermas does argue the three rationalities must be co-ordinated, or come together, in deliberation (Jaegar et al 2001, p.236-237), but he seeks to delineate between the different warrants of these particular forms of discourse.

This discursive specialisation raises challenges for the application of discourse ethics to biotechnological hybrids. There are implications for which participants in deliberative processes can speak for nature or the material world and through what repertoires they may warrant their claims to speak for nature. In particular, by privileging science to speak for nature, and morality to speak for society, Habermas risks re-inscribing the modernist separation between the processes of political and scientific representation, whilst it is precisely in this division that some locate the difficulty of adequately addressing the social and scientific concerns intertwined within biotechnology (Latour 1993; Hinchliffe 2001). This purification of nature and society presumes an ontological divide between mute objects and speaking subjects. In this framework, the representation of those animals and other organisms enmeshed in biotechnological practices is particularly problematic, for their interests are spoken for through forms of instrumental rationality that construct them as the singular objects of scientific enquiry. In seeking to confront this asymmetry, Whatmore suggests notions of the ethical subject need to be relocated – "this requires a hybrid concept of community which disrupts the purification of culture and nature into distinct ontological zones, onto which the binary of 'human'-'nonhuman' is then mapped" (Whatmore 1997, p. 46). This relational understanding of ethical agency and community offers two benefits (Whatmore 1997, p.47). It retrieves 'nature' from the status of object with no ethical standing, without resorting to the problematic extension of liberal conceptions of ethics to animals. Furthermore, through a focus on an intersubjective understanding of ethical community, made through the corporeal connections between different actants, it liberates the kinds of vocabularies that can be understood as constituting ethical judgements.

For Habermas, the proper articulation of different forms of reasoning is encompassed in the universal goal of constructing non-coerced mutual understandings and agreements. Habermas calls this communicative action, and considers it the highest form of rationality, since all other forms rely on it as their basis. Yet as Pellizzoni has argued, this assumption of the unity of reason means deliberative processes may fail to confront powerful forms of instrumental rationality for "power signifies establishing not only who may speak but also

how they may speak" (Pellizzoni 2001, p.61). There are not only problems for the representation of non-human interests in deliberative processes, but also questions about the practices of deliberation itself, and the location of the human bodily subject within deliberative spaces. In seeking to ground a communicative rationality in universal norms, Gardiner suggests Habermas replaces the "incarnate and differentiated moral subject with a generic, hyper-rational being" (Gardiner 2004, p. 34), whose claims to universalism depends on a communicatively competent, but fundamentally disembodied subject (Alway 2000, p. 138). Deliberation is thus seen to take place in an "abstract space disconnected from experiential, embodied and affective human qualities" (Gardiner 2004, p.43).

In the same way that relational thinking offers a potential counter to the limited construction of 'natural objects' within deliberation, so too there is value in bringing back a situated and interdependent subjectivity by attending to the corporal embeddedness of all subjects within deliberative processes. This argument has been particularly rehearsed in feminist critiques of Habermas's conceptualisation of the public sphere and subjectivity (Alway 2000; Gardiner 2004; Pellizzoni 2001; Whatmore 1997; Young 1987). They argue a lack of attention to lifeworld means Habermas risks giving ontological primacy to a notion of the subject, which comes close to the individual autonomous agent problematically institutionalised within contemporary bioethics. This construction values moral reasoning that can be dissociated from empirical contexts to pertain to abstract notions of the good society (Habermas 1990, p.180). In particular, critiques of this norm of ethical reasoning raise charged questions about women's relation to the privileged status of the abstract quality of rationality in deliberation (Benhabib 1995; Whatmore 1997). They suggest that not only does Habermas's approach construct a specific form of individual ethical subjectivity, but, as women may articulate more relational senses of self (Gilligan, 1982; cited in Whatmore 1997, p.44), this construction is one women are less likely to perform comfortably, and thus norms of ethical reasoning may devalue women's experiences and forms of expression.

There are thus many challenges to the performance of ethical reasoning around biotechnology within deliberative processes, which lead to further questions about the end-points of deliberation, with which I want to end this section. A relational form of thinking about corporeality and hybridity requires a different understanding of the nature of representation and thus the outcomes of dialogue. At the core of Habermas is the principle that there is only one 'right' response to a problem, which parties are able to communicate about in order to reach agreement upon (Pellizzoni 2001, p.71). This assumption of the reflective nature of representation means that only certain forms of expression are seen to constitute the required openness to communicative rationality. This principle can lead to a

concern to regulate speech acts, excluding recourse to humour, irony or parody, in order to close down meanings around consensus. Yet we know, in discussion, people frequently do not express themselves in ways accord to the ideals of this communicatively competent subject. They use laughter, outrage and rely on colloquial categories to present persistent arguments about the 'unnaturalness' or 'yuk factor' of biotechnology, which are frequently dismissed as unreasonable and irrational. The durability of these terms of debate means their operation is increasingly being taken seriously (Deane-Drummond et al 2003; MacNaghten 2004; Midgley 2003). Such representations are seen as irrational or emotional only if they are taken as literal expressions that can be read at face value, on the epistemological terms that grounds the scientific search for secure representation (Wynne 2003). Such work is suggesting, instead, "these public judgements might be intellectually substantive and amenable to public debate, even if they are not deterministically resolvable" (Wynne 2003, p.231).

This renewed attention to the forms of argumentation and the construction of rationality within public debates around biotechnology reveals the conflicting ontologies of personal, natural and moral order making themselves felt in the politics of everyday life (Deane-Drummond et al 2003). It also reveals the operation of power in these processes, as power blurs the dividing line between rationality and rationalization' (Flyvberg 1998, p.2). For this study, it raises questions about the kinds of reasonings used by participants in the Deliberative Mapping processes, and the kinds of epistemologies and ontologies on which they are based. It brings back questions about how 'nature' figures in multiple ways as a rhetorical resource for opening up the ethical repertoires through which people seek to understand and contest the new hybrid forms of life proposed. Though close attention to the contexts in which such arguments are made and legitimated, it also promises to hold onto the hope of deliberative processes to offer a space to explore the tensions between lifeworld practices and instrumental rationalities. Yet the outcomes of deliberation are reframed, to those in which there are no finalizable representations, rather a set of political ontological choices about the collaborative performance between co-participants of the wider networks around biotechnological hybrids.

Mapping Deliberation

These questions have provided a framework for the further qualitative analysis of the outcomes of the citizen panel discussions, which took place in the development of the Deliberative Mapping process on future options for addressing the 'kidney gap' – the gap

between the organs available for transplantation and the numbers of patients suffering end-stage renal failure. Deliberative Mapping (DM) is the name given to a novel method for informing decisions on complex socio-technical issues, developed by a group of researchers from the University of Sussex, University College London and the Policy Studies Institute. DM seeks to address concerns about contemporary methods of public consultation, in terms of who frames decisions and options; and presents a challenge to processes that close down the outcomes of assessment to a single numeric or group consensus around a single option. The DM process presents an open framing of solutions to a problem, offering evaluation of a range of options – in this case, high technology options like xenotransplantation, stem cell research and artificial organs, through to the reorganisation of health care services around preventative measures, presumed consent, living donation and infrastructure improvement. A multi-criteria appraisal framework ensures a range of criteria is considered in evaluating options, whilst the deliberative parts of the project allow participants to explore and share the reasonings that underpin their judgements. Assessments of options are thus both quantitative, mapping the performance of each option against a range of criteria; and qualitative, exploring the arguments participants use to justify their judgements.

Piloting this process involved working with 17 specialist participants with various expert perspectives, and a diverse group of citizens from North London. Both specialists and citizens went through a similar appraisal process (for full methodological protocols see Davies et al, 2003). The citizen strand of the DM process, which is the main focus of this paper, involved four panels of 8-10 members, held in the London Borough of Camden between April and July 2002. The panels were differentiated by gender and socio-economic class, with mixed ages and ethnicities, to create a supportive yet diverse environment for members to exchange experiences and undertake the challenging assessment tasks. Each group met six times, for two-hours every fortnight, to work through the component parts of the option appraisal. They developed shared understandings of the options, derived and weighted the criteria important in judging between them, and scored option performance against their chosen criteria. Each group worked separately, meeting only once in a one-day workshop in which all citizens and specialists had the opportunity to meet face-to-face and to explore and question each other's judgements.

The DM process thus seeks to construct a structural symmetry that acknowledges and locates the rationalities of both specialists and small groups of citizens in framing and assessing options, with all participants following the same multi-criteria appraisal process, yet with the appraisal process capturing different framing rationalities at all stages.

However, despite these attempts at symmetry, asymmetries remain, especially in the representation of the outcomes of the process outside these deliberative spaces. The processes of reasoning that underpin the patterns of option appraisal are perhaps the more important and more difficult to communicate. The quantitative patterns of option appraisal may fit more comfortably into frameworks of technical decision-making, whilst the qualitative analysis, exploring the diverse judgements that underpin these patterns, reveals terms of debate that exceed the categories of modern reasoning. This is exemplified by one member of our project advisory committee, who queried at the end, "has Deliberative Mapping given us information about the relative values and consideration used to form informed opinions on the kidney gap, or has it merely quantified gut reactions?" (cited in Davies, 2003, p. 188).

The language of gut reaction is telling, for, as I suggest, such corporeal discourses perform an important function in thinking through the implications of new biotechnologies for the way we conceptualise human corporeality and our relationships to the natural world, for both specialists and citizens. Yet it has a further layer of meaning, suggesting a lack of authority for citizens when using these vocabularies as the basis of their reasoning. In this case, as in others, the force of argumentative strategies in different contexts is ultimately linked to wider contexts of power, which discounts these as legitimate forms of ethical reasoning. Answering this question demands careful examination of the arguments used to underpin and warrant the different modes of argumentation within citizen discussions and elsewhere, and an awareness of the context dependent nature of rationality, which blurs the dividing line between rationality and rationalization (Flyvberg 1998) in reconsidering the aims and outcomes of deliberative processes.

Corporeal reasoning

In important respects, the medical technologies of organ transplantation depend on a Cartesian division of the world, assuming we have transcended anthropomorphism and live in a rational world, compartmentalised into domains, where mind and body, self and other, life and death are separate and distinct. In this context, the removal of organs from one individual on death, and their replacement into another, forms a sensible recycling of redundant material, which can contribute to greater societal good. The ethical reasoning sustaining organ transplantation is thus embedded within Western Enlightenment ethics, in particular John Mills' utilitarianism and Kant's deontologism. Transplantation as a surgical intervention can be seen as a series of technologies dependent upon a material and fragmented body that is both the property of the self, and can be divorced from identity.

However, there is evidence these objectifications do not enjoy widespread support amongst some lay communities (Lock, 2002) and they may be resisted by both potential donors and recipients (Gordon 2001a; Sharp 1995). Furthermore, they are contradicted by other dominant ideas around the wider social networks involved in organ transplantation, particularly the promotion of altruism and the notion of organ donation as a gift (Fox & Swazey 1974; Ohnuki-Tierney 1994; Sharp 1995). Whilst surgeons stress that organs are mechanical pumps or filters that can be exchanged between bodies, at the same time they are figured by transplant co-ordinators as personalised symbols of generosity – the 'gift of life'

Thus, surgical teams, transplant co-ordinators, patient counsellors, donor families and transplant recipients all operate with different versions of what the body or an organ is. At times this multiplicity leads to the orchestration of a successful outcome, for the 2,867 people in the UK last year who began living with a transplanted body (UK Transplant 2004). At other times, these different versions of reality clash, as donor families cannot accept the mechanical objectivity of a severable body (Lock 2002), as potential recipients chose to remain on dialysis rather than risk the interventions and uncertainty of further surgery (Gordon 2001b) or as transplanted organs are rejected. A phenomenon known as a 'response shift', under which transplant patients' understanding of their condition may influence their health outcomes (O'Neill 2002; Wilson 1999), further highlights the connection between the discursive and material construction of transplanted body, and the importance of attending to the different ways people understand the constitution of their own bodily integrity in relation to the acceptability and success of medical interventions.

In the DM discussions, we encountered a wide diversity of views of the body held by different participants. Most participants were prepared to accept current forms of organ transplantation as an ethical procedure; although a few remained uneasy throughout discussions, they were a small minority. However, there was considerable deliberation around all the future forms of organ transplantation, with many debates rooted in conflicting ontologies of the body. At times, exchanges relied on a fundamental acceptance of a body-mind duality, to seek accommodation between diverse cultural perspectives in a plural society, through debating frameworks of individualised informed consent.

> DAVID: I take a very strong standpoint on it, I feel that personally you should carry a card if you don't want to donate organs. Organ donation should be compulsory. That's a very difficult argument but basically your body's useless, it's worthless. So if you're going along with this sort of thing about the body

being a vessel for the spirit, then once it's empty then use it, you know. It's a very strong viewpoint but that's where I stand on it.

PETER: You've got so many different cultures in the country, where certain burials and things have to be done, then that's a very difficult thing to do, especially in modern society where you've got so many different people. I think that if you carry a donor card then your view should be respected. But I don't think you should be forced to carry one, certainly not, certainly not (BC1 men's panel).

However, at other times debate indicated considerably more ambivalence about the mobilisation of a set of apparently closed constructions of the body and its organs. Drawing on repertoires that break out of modern binary categories, such deliberations compose links between identity, flesh, death and memory; open out bodies to all kinds of family and social relations; and move from formal reasoning about the nature of informed consent to languages of connectedness and affectivity that are visceral, metaphoric and emotive.

DANIELLA: I think for me, my father died some ten years ago when I was in my early 20s. It was horrific, absolutely horrific, and I would just feel that if he had had a donor card and his organs were put to use elsewhere, and helped someone else so that they wouldn't have to go through what I had to, or my mother in her 40s, I'd be delighted, absolutely delighted. What does he know?

AIMEE: It's funny how I have totally different views. I lost my father two years ago, also he was very young and I couldn't bear the thought of him … I like to think of him being exactly how I remember him. It makes me feel nauseous, the thought of someone hacking into his body. And that's purely selfish, I absolutely 100% understand that, but I couldn't bear it.

ANNE: But we are totally wrapped up in our flesh, this is what we are so I think this is the emotive thing. People can't think of little glowing balls, they think of the person they knew and loved, and that's where it becomes very complicated.

AIMEE: That's why I am pleased to think …

DANIELLA: But that's why you have memories (BC1 women's panel).

Such discussions are shot through with a sense of the body, its relation to personal identity and social networks, its substance and its fragility, both during life, and once life has ended. There are different perspectives about organ transplantation being debated here, but they draw on ontologies of the person that challenge accepted medical constructs around the

body and individualised consent, their visceral forms of argumentation bringing the separated surgical and social worlds into one narrative.

The distinction between the forms of reasoning in two extracts is striking. The first accords to the forms of principled, rational and disembodied deliberation expected and accepted as publicly warrantable reasonings around organ transplantation. The second can be considered 'profane', for it contradicts the specialist divisions of labour around the institutional forms and discourses of organ transplantation. It is what calls Whatmore calls the 'visceral vernacular' (Whatmore 2002), or what Hwa Jol Jung has termed a 'carnal hermeneutics' (cited in Gardiner 2004, p.31). Through the exchange of personal narratives, different lived experiences are brought to enliven, with material fleshiness, the complexity of decisions involved in organ donation. The different forms of reasoning are exemplified here with extracts from the men and women's panels. Whilst all group discussions at times relied on different forms of reasonings, there was a difference in the performance of deliberation in the two sets of discussions. Whilst not suggested as essential differences between gendered argumentative strategies, in the DM experience, the men's panels appeared more comfortable with abstract social forms of reasoning, whilst women more frequently explored narratives about how the issues under discussion would affect them and their families personally (Davies & Burgess 2004).

This is significant, as it suggests women in particular may reject the modernist ontologies of organ transplantation, separating mind and body, life and death, even in its established forms. As the above extracts indicate, the rejection of this ontology does not mean organ transplantation is necessary ruled out; rather forms of argumentation around it take shape in different ways. Sharing personal experiences and intuitive feelings constitutes authentic dialogue for these participants in these contexts. They are accepted as meaningful in relation to the collective enterprise that is organ transplantation; they are recognised, debated and learnt from, as relevant contextual knowledges. Yet this implies that consultation premised on narrow forms of ethical reasoning may exclude relevant values and knowledges from some, especially women, who are frequently understood as the gatekeepers to decision-making about health. Furthermore, it suggests evaluation of the future means of closing the 'organ gap' cannot be separated from the ontologies of the body they propose. This is particularly relevant when considering xenotransplantation, as this augments the dualisms of organ transplantation by adding the further category of animality. As Woods suggests, the xenograft emerges at the site of tensions as an icon of Cartesianism, a series of technologies dependent upon the fundamental dichotomies of Western biomedicine (Woods 1998). The DM process suggests that people are able to

grapple with evaluation of complex science and technology issues within this framework. Nevertheless, many of the challenges to xenotransplantation overspill these categories, through forms of talk that seek to understand the ontological continuities and discontinuities between animal and human bodies and impure utterances that both inhabit and contest these new hybrid forms of life.

Grotesque nature

The category 'nature', its inhabitants and its transgressors, continues to feature prominently in political and public debate around biotechnology. As Haraway and Castree suggest, the signifier nature is simply something we cannot not revert to (Haraway 1992, p.296; Castree 2004). Representational acts about nature, the body, and the monstrous remain critically entangled in the processes of constituting and contesting new forms of biotechnology. As in many other instances, the DM discussions are permeated with different kinds of nature talk, particularly about process that might be 'tampering with nature', or 'against nature'. Yet, this recourse to arguments about nature does not perform a naturalistic foundationalism, which suggests the natural world should be the source of norms humans should obey. In all panels, interference with nature is recognised as a routine reality of human existence and development, the acceptable boundaries of which is both subject to constant change and cultural difference. Notions of unnaturalness thus have various meanings. They express ideas about things that are new or unusual, that are artificial, and that are repulsive. In this context, it is possibly for one participant to speak in support of artificial kidneys, by arguing, without irony, that they are the most 'natural' option, for being the least repellent. It is this notion of something unnatural being repulsive that I want to explore here, for along with others, I want to argue that these feelings and repulsions are not intellectually vacuous, but are morally relevant forms of reasoning (Midgley 2003; Wynne 2003). Such statements reconnect modes of argumentation with the hybrid human and animal matter that are being transformed, and are powerful ways of examining how the boundaries of ethical communities and notions attachment are being redrawn. These discussions do not necessary lead to principled refusal of any new animal biotechnology, but they shifts the nature of ethical reasoning around the organ gap, to recognising the ontological investments embodied in the end-points of such technologies, their implications for the intercorporeality of human and animal bodies, and the status of the new hybrid forms of life proposed.

The women's deliberations around allotransplantation, stressing the visceral qualities of organ exchange, escalate in discussions of xenotransplantation, as people work through the

implications of what Stassart and Whatmore call the metabolic intimacies between human and non-human bodies (2003, p.449). Through discussions about food, cannibalism and bestiality, people make reference to the material properties of the living and disaggregated bodies of humans and animals, to make sense of this new use of pigs. There are strong 'gut reactions' against xenotransplantation, but these are debated, through exploring the corporal equivalence between human and animal bodies.

> BIANCA: I wouldn't want a pig's kidney in me. I wouldn't want to know that I'd got one in me … If I had an operation and I had a pig's kidney in me, I'd feel physically sick every day.
> KATE: You'd rather die?
> BIANCA: Dying isn't so bad, if you're meant to die, you're meant to die. I just can't bear the thought of an animal, a kidney, an animal heart or anything.
> KATE: But think about it right, if you took out your own kidney it would look absolutely disgusting, you'd probably throw up.
> ANNE: Yes, but once you've fried it up with the onions its fine.
> Group: [laughter]
> BIANCA: But we're human!!
> KATE: But we humans are ugly anyway.
> BIANCA: No, I don't mean in their ugliness, I just think a pig's kidney to keep a human alive … I just think "oooh". (BC1 women's panel)

Yet these are not gut reactions overcome through 'rational' debate. Through their discussions with scientists at the workshop, for some, these feelings actually intensified. The attempt by specialists to placate the emotion and sense of outrage through reassurances about informed consent, patient safety and clinical trials missed the point. This is not an inarticulate disgust; rather these participants are saying something intelligible that needs to be discussed. There is an argument here about the importance of taking the ontological commitments of such technologies seriously. As Midgley puts it "in biotechnology a new ideology is being proposed that would remodel concepts of nature and species to fit the new technologies, envisaging species as unreal and nature as infinitely malleable" (Midgley 2003, p.103). Many participants resist this re-ordering of nature, and through these visceral languages seek to connect abstract reasoning around ethics to the materiality of their and animal bodies, seeking to understand how these new ontologies rework their sense of self and other.

The very concern expressed about boundary crossing emerges from the correspondences drawn between the corporeality of human and animal bodies. In dialogues around xenotransplantation, both the ethical and corporeal boundaries between humans and animals become uncertain and fluid, with new continuities and discontinuities suggested. This is complicated by the exchange of genetic material between pigs and humans, which makes organisms difficult to locate using established repertoires of the individualised ethical subject. As David suggests,

> The whole ethics issue is frightening because you do have to, to some extent, humanise the animal, and then of course the human becomes – their entire body is saturated with pig cells – so they aren't entirely human anymore! It actually then becomes rather alarming, do they then lose their rights because they're not 99% human now. "You're a bit piggy guv'nor, sorry!" Suddenly, it's like this could be your cousin! "Hang on a minute; I'm not having bacon tomorrow". So how far, how ethical is it. And then do a new set of rights apply to those particular chimera human pigs (BC1 men's panel).

A new ontological order is thus proposed through xenotransplantation, which troubles the application of established ethical principles to new forms of life that are seen as different from either existing human or animal bodies. Drawing on arguments that this 'against nature', opens up the fact there is a sense of order that is being challenged. However, this is not a static natural order, rather xenotransplantation is disordering on several fronts. The promotion of xenotransplantation challenges participants' understanding of contemporary progressive developments in animal welfare. It exposes the limitations of current ethical and consequentialist thinking for taking proper account of the risks to animal and human bodies, as participants struggle to extend the notion of the right bearing autonomous individual into the worlds inhabited by these hybrid entities. And it draws attention to the shared corporeality of human and animal bodies; whilst also instituting new axis of discontinuity for those pigs singled out for breeding programmes and those people facing decisions about accepting human or pig organs. Participants thus perceived a neglect of appropriate consideration and responsibility for the identity of the new forms of life being created. Who could speak for these blank figures? What kinds of argumentation were relevant for considering the consequences of these new agents in refiguring the relations of organ transplantation? And given recognition of the connectivity between human and animal bodies, what does it mean to neglect the identity of the new entities forged?

This disorder is most evident in the frequent recourse to points of argumentation that appear to take discussions "beyond reason", as participants express concern about these experimental animals through arguments about monstrosity. Such arguments exceed Habermasian warrants to speak of the material world through science. Instead, they link material, moral and aesthetic domains, in proclaiming xenotransplantation a gross insult to both natural and human life. As Loretta exclaims,

> They can't even breed them properly. There are all these mutant-cross mistakes that they're making. It's just they're making monsters. It's not like it's on the farm all happy and then it had a painless death, and then you take its kidney out. The animals are dying left, right and centre. They can't know what they're doing? (BC1 women's panel).

Such troubling animals are seen as against nature, in the context that many people find beauty in their everyday life through what they talk about as 'nature', in the presence of pets or being in wild nature (MacNaghten 2004). Loretta's comment also locates her own powerlessness in the face of this disorder through her final unanswerable rhetorical question. Szerszynski identifies such statements as a neo-liturgy of risk, as modern reason is exhausted. He suggests "we have moved from the theology of the beautiful to that of the sublime – from the possibility of order and desired harmony to that of the irrational, the ungraspable, the scatteredness of being in risk society" (Szerszynski 2003, p.219). If talk about 'nature' evokes the ontological reordering involved in biotechnology, discussions about 'playing god' asks questions about the authoring of corporate expectations and the responsibility of those agents centrally involved in developing these new forms of life.

Playing God

That people may hold spiritual views is widely recognised in public debate. A more pluralistic society has ensured a range of religious and ethical views have to be taken seriously. In relation to organ transplantation, there are different theological doctrines and everyday religious practices that may influence people's willingness to donate to organs (Exley et al. 1996; Lock 2002; Rappaport & Rappaport 1998). Different beliefs also affect the acceptability of various new technologies to address the organ gap (Hagelin et al. 2001; Sanner 2001). The Christian theological dimensions to arguments about genetic modification are explored in the recent collection by Deane-Drummond et al (2003). This unpacks the forms of reasoning encapsulated in the oft-heard idea that genetic technologies

are ‘playing god’. They highlight how such repertoires question the theological and ontological dimensions to genetic modification, as well as querying the “moral significance of the motive” (Drummond et al 2003, p.321) of those promoting new forms of biotechnology.

However, in public debate, such forms of argumentation are frequently disregarded as ill-founded colloquialisms, or attenuated by a relativism and universalism, which reduces religious commitments to a thin veneer of weak tolerance (Bohman 2003). There is a feeling that religious language cannot be understood by outsiders, and isolated from the rest of our reasoning, religious views are un-discussable (Midgley 2003). To be respected, but not deliberated, such views are translated from active dialogue about moral rights or wrongs, to criteria about social acceptability, which can then be traded off, as subjective preferences, against feasibility, cost or other criteria. Concerns about the morality of outcomes are transformed to the evaluation of means, shifting reasonings from substantive social rationalities, to ones that can be made calculable. In the same movement, arguments about the embodiment, or ensoulment, of animals or embryos is displaced to concerns about offending social beliefs.

In the DM discussions, participants recognised the importance of a range of personal religious beliefs, but were prepared to debate them. Religious beliefs and spiritual repertoires appear frequently across all panels, in discussions of all options, including the use of embryos in stem cell research, the religious acceptability of using pig’s organs, the treatment of the body after death in different forms of organ donation, and in less formalised concerns about ‘playing god’. Yet within participant discussions, such spiritual views are not treated as purely private preferences. Rather they raise a series of collectively meaningful dimensions about a shared social responsibility for the means through which health is pursued. Participants often use religious vocabularies as starting points to open up dialogue about what is important to them. Rather than seeking to resolve these discussions through abstract principles, they frequently generate common ground through reframing questions to explore the imperatives framing each option and the influence this has on the details of its practical operation.

> ANDREA: For me it's the spiritual side of things as well. Now I believe in the soul, when does the soul begin, you know?
> SHAY: Yes, it [stem cell research] is inhumane and spiritual would be part of the reason why it's inhumane. That would otherwise evolve wouldn't it, that egg?
> EMILY: That's what it's intended for. It's playing with nature.

SHAY: Just to take an egg to fertilise it, to take what it, to create a liver, is I just think, it's terribly wrong …

GEORGIA: They're not doing that though, they're not taking, fertilising an egg specifically to do that.

SHAY: No, …

GEORGIA: That's because I agree with that, I said it wouldn't be right to make an embryo just to use it as research, but they're going to be destroyed anyway, they've already been made for other purposes. Most of the cells come from couples that have gone for IVF and they're basically left over. So they've been fertilised. But as you know with IVF, they only put two or three fertilised eggs back into the body. So if they wasn't used for research and people didn't want to donate them to childless couples, which a lot of couples don't, they're just basically destroyed anyway.

EMILY: And what happens when you run out of embryos?

ANDREA: I'm still a bit unsure; I don't think we know enough about what they're doing at this stage (C2D women's panel).

FRED: I think as the group's gone along, as the weeks have gone along, everybody's become more open minded. The initial session was religious objections and this, that and the other, one sort or another. And things have gradually sort of taken a more practical turn. And there's also been more cohesion, people coming together, I think with a less divergent view of things (C2D men's panel).

For participants, the moral and spiritual dimensions to their arguments were prompts to consider the practical issues of demonstrating due care for all entities involved in biotechnological process, for instituting appropriate and robust forms of control for all actors, and fundamentally for questioning the motives driving each new development. Rather than closing down arguments through adherence to deductive systems of imperative statements, the path of participants' discussions stress the openness of the ontological orderings around the potential options for organ transplantation. The passage of argumentation thus contradicts Habermas's presupposition that discourse moves from the pragmatic to the ethical level, in the inner evolution of discourses towards mutual understanding and thus the right response to the problem (Pellizzoni 2001, p.69). In these conditions of uncertainty, people do not move to definite principles, but seek judgements on the outcomes of different forms of practice. Participant discussions thus enact a process of questioning the way each new form of organ transplantation seeks to reorder relations between individuals, societies

and animals, whether increasing reliance on medical technology, building personal capacity for wellbeing, prolonging individual human life through animal parts or developing social support based on reciprocal care and generosity.

The openness to alternative framings and rationalities in the DM process allows citizens to question the framing of each option as a solution to the organ gap and promotes full discussion of a wide range of alternatives. These discussions are not merely about the desirability of different means to achieve a pre-given end, but involve judgements about how different actors position themselves within the essential openness of the potential trajectories of current organ transplantation techniques. Such discussions frequently reveal participants' discomfort with how powerful stakes frame the problems to which biotechnological interventions are the solution. As Emily comments, 'when you've got to resort to doing that [using pig's organs], something's going wrong' (C2D panel). In conditions of uncertainty, the human purposes for decisions that will result in unknown consequences are key (Wynne 2003, p.237). Wynne thus interprets these public statements as "oblique references to the experience and judgement of the dominant institutional actors, their alleged hubris, haste and irresponsibility" (Wynne 2003, p.242). Whilst the theological or spiritual dimensions to participant discussions highlight the serious manner in which they consider new biotechnological developments, such attitudes of respect are felt to be absent in the performances of certainty and rationality evoked by biotechnology companies themselves.

Hubris and Nemesis

In her reflections on biotechnology, Midgley writes that, "hubris calls for nemesis and in one form or another its going to get it, not as a punishment from outside, but as a completion of a pattern already started" (Midgley 2003, p.104). In this final empirical section, I explore the fact that, whilst we have struggled to make sense of these repertoires to policy-makers, what is equally striking is their ready adoption by powerful actors in this debate. In press releases and press comments, religious imagery and discussions of the unnatural forms of nature constitute a significant part of the repertoire of biotechnology companies, as they proclaim the hope of new medical breakthroughs, or seek to reconstruct ideas of human bodies and animal species to facilitate new biotechnological transformations.

One press story has dominated xenotransplantation debates in Britain. This article was written by David Concar for the *New Scientist* in 1994, following a press release by

Immutran. It was used to represent the company's views in the debates organised by the Nuffield Council of Bioethics (Nuffield 1996), and has subsequently been analysed by several sociologists of science (Brown 2000; Woods 1998). The article starts as follows:

> At a secret location in Cambridgeshire, researchers inject human DNA into a pig embryo. Six months later Astrid, the world's first transgenic pig, is born – of a virgin, in a sterile stable, on Christmas eve. The hope is that the implanted gene will make pig organs' compatible with the human immune system, thus helping to solve one of medicine's fastest growing problems: the shortage of organs for transplant surgery (Concar 2004, p.1).

Brown explores how the article plays with the boundaries between the scientific and the symbolic (Brown 2000). These competing discourses both accentuate the scientific rationality of the story, whilst seeking through symbolic means to ensure its wider relevance in reordering the socio-technical networks of organ transplantation. The spiritual repertoire signals a disjuncture in the overall temporal shape of innovation and science; through the notion of the medical breakthrough, it underlines the relevance of the new to the future. As Brown asserts, such breakthrough motifs are intimately tied into the two-fold practical orchestration of present problems and future solutions (Brown 2000). The representation of the Immutran breakthrough provides a naturalised or 'black-boxed' rendering of the xenotransplantation solution route. This effectively endorses the indivisibility of the fate of the technology and the fate of patients at the mercy of the critical shortage in replacement tissues and organs. This is a powerful cultural representation, but it is also socio-material act, that seeks to enable a temporal sorting within broader socio-material heterogeneity, such that the 'fate' of patients is dependent on the miraculous trajectory of scientific developments (Brown 2000). This article is perhaps the most prominent example of this trope, but it is by no means unique. A subsequent litter of transgenic pigs, born in the US facilities of PPL therapeutics, was announced in a press release early in 2002. The report announced the birth, on Christmas Day, of five cloned piglets, named Noel, Angel, Star, Joy and Mary.

Such powerful actors are also addressing issues of species identity, aesthetics and monstrosity to persuade publics and investors of the possibility of crossing species boundaries (Brown & Michael 2001). At times, biotechnology companies evoke the fundamental similarity in structure and function between human and other animal bodies to suggest we can use them to model human physiology and their tissue to treat human

disease. At other times, a sense of ethical and physiological discontinuity between animals and humans underpins the moral and safety implications of using animal bodies as repositories of spare parts (Brown & Michael 2001). Despite these complex axes of similarity and difference, arguments about the disordering implications of crossing species boundaries are consistently sidestepped by claims that they haven't been creating monsters – the ultimate marker of impurity and ambiguity (Davies 2003). As Ron James, then director of PPL therapeutics reflects, in an interview for *The Guardian*,

> James admits that "genetic abnormalities" can occur. So how many animals are born abnormal? "Taking all the experiments we've done, I would guess it would probably be about half." Most of these victims have internal disorders, such as kidney malfunctions. James says: "There's been nothing you'd regard as being a monster. We haven't produced animals with two legs, or three heads, or anything like that." He continues: "You have to look at whether the end justifies the means" (Clark 2001).

Biotechnological companies use these spiritual and natural narratives to fold into a singular account the distress of kidney patients with the future hope of new technologies like xenotransplantation. Their hubristic visions, of a future of unlimited organs relieving all suffering, hold together this network; patient suffering acts as the 'delegate' that facilitates the exchange of venture capital, genetic material and bodily organs (Latour 1993). The purification of the figure of the suffering patient, removed from the corporeal, cultural, social, economic and political contexts of health care, and omnipresent as the trump card in modes of argumentation, means the ends cannot be criticised, nor any means of achieving them. Yet in the DM panels, participants' vocabularies frequently bring these wider networks of agencies and entities out of hiding. Discussion of the shared corporeality of human and non-human bodies displaces the singular figure of the transgenic pig as the rallying point for the alleviation of suffering. Discussion of the motives of corporate biotechnology raises questions about who is 'playing god', and the legitimacy of their framing of the problem. Participants thus relocate a set of choices about future organisation of organ transplantation back into a wider and relational set of social, cultural and natural contexts.

All the options are seen by citizens as uncertain, whether in changing people's behaviour around donation, accounting for potential risks of xenotransplantation or improving the organisation of transplant services. In these conditions, the limited vocabularies of modern rational debate are inadequate, giving rise to moments when argumentation moves into new modalities, reaching to a liturgy of abandonment, asking questions of risk society than none

can answer (Szerszynski 2003) or the evoking the grotesque to indicate the limits of trading off costs and benefits have been reached. Various repertoires are suggested to move beyond the impasse that is reached at the end of this instrumental form of reasoning. For Deane-Drummond et al this is a place where discussion about God becomes possible and permissible (2003). For others, this is about moving into a self-reflexive modernity in which ethics is unsettled and open-ended, relying not on principles but on the practical exploration of casuistry (Darier 1999; Toulmin 2001). Both find their expression in the forms of participants' discussion encountered in the Deliberative Mapping project. However, perhaps both most conspicuous and most commonplace is discussion of the metabolic links and limits of exchange between human and animal bodies, that involves contested representations of the properties of nature, but more than that is a debate about the ontological significance of the corporealisation of new hybrid organic forms. Yes, some of these statements are questionable, but that is precisely the point. They are questionable public judgements about the end-points of biotechnological trajectories, rather than intellectually and politically vacuous gut reactions to biotechnological means.

Conclusions

In concluding, I return to my opening questions about the potentiality of deliberative processes to offer a space to explore different kinds of ethical reasonings, the political implications of this multiplicity for the outcomes of deliberation, and the consequences for academics in understanding and staging such public engagement activities. I reflect on what it means to be engaged in a politics that is doubly hybrid; governing hybrid socio-technical communities through institutions that operate within the professionalized domains of ethical, scientific and political discourse.

Every new form of scientific or technical initiative now has its ethical or public engagement strand. This is instituted through the governance strategies of universities, research councils, government departments and European committees (e.g. House of Lords 2000). Yet critical questions remain about the impact of these activities on the governance of science and technology. Despite commitments to consider the more symmetrical constitution of science and society, many asymmetries remain. There are now numerous examples of public engagement that demonstrate the ability of citizens to develop understandings and frameworks for evaluating science and technology that, in important respects, mirror the frameworks of expert argumentation and identify as public concerns areas of scientific uncertainty. Yet, policy-makers are consistently reluctant to take on board

findings from engagement processes, leading proponents of public engagement to shape citizen argumentation into forms of rationality they cannot ignore, which are calculable within existing institutional frameworks.

At the same time, citizen vocabularies, viewed as profane from the perspective of technical optional appraisal, are readily adopted by powerful commercial actors themselves in their refutation of public concerns, or in authoring of public expectations for new technologies. The languages of the sacred and the profane illustrated here provide one route to tracing these dynamics. They are different performative strategies to picture the forms, capabilities and actions of the things constituted through these new geographies of biotechnology. Such vocabularies powerfully reconnect modes of argumentation with the human and animal matter and processes that are being transformed, addressing questions to the end-points of the recent realigning of socio-material orders in biotechnology. Yet, the challenge for academics is that only powerful actors are able to make use of these vocabularies within legitimate public spheres.

Flyvberg equates this inequality with the fundamental asymmetry between rationality and power in modernity (Flyvberg 1998). He suggests this forms a basic weakness of modern democracy, which needs to be addressed in the light of the context dependent nature of rationality. To take Enlightenment ideals seriously, he suggests, means understanding the Enlightenment in anti-Enlightenment terms, that is, in terms of the Nietzschean will to power and Foucauldian rationality-as-rationalisation (Flyvberg 1998, p.3). This paper has similarly proposed that by attending to the construction of hybrid ethical communities and operation of intercorporeal subjectivities, it may be possible to hold on to the possibilities for practical engagement offered by deliberative processes, without Habermas's dependence on a modern constitution that warrants reasoning through distinct ontological domains. This means attending closely to the forms of rationality enacted through different kinds of processes; to obtain a better grasp of what modernity and modern democracy are and what kind of strategies and tactics may help change them for the better (Flyvberg 1998, p.3). Practically, this may include seeking processes that open-up policy options, promoting the production of diverging views, and encouraging understanding of dissent, the productivity of different kinds of social rationality, as well as the benefits of consensus (Stirling 2005). Alternatively, it could involve pursuing public engagement on other epistemological grounds, exploring the potential for taking vernacular knowledges to policy-makers through innovative methodologies (Degen et al. 2003). It also means extending our visions beyond the way communicative rationalities are enacted within individual engagement processes, to attend to the link between agents, identities and power that texture the contexts and audiences for

these debates. Such tactics lead to a rather different interpretation of the role of public engagement processes in opening up spaces to stage an encounter between differently situated rationalities.

Gardiner locates this within Bakhtin's politics of impurity, a political dialogue without a finalizable representation (Gardiner 2004). However, this does not preclude the fact that deliberative processes may promote dialogic concordance. As Pellizzonni writes, "more than a form of discourse or argumentation [deliberation] is a co-operative activity" (Pellizzoni 2001, p.75). In our experience, agreement was a significant feature of the group discussions. Despite the different modes of argumentation experienced within different panels, and the divergent personal viewpoints expressed, the final outcomes demonstrated considerable agreement in practice, around the need for more social and organisational responses to the crises around organ transplantation. Participants had different reasons for reaching this point; an abstract sense of promoting organ transplantation as commitment to creating a good society, an intuitive endorsement of a relational view of the body as open to the support and needs of others; or gut reactions against the reordering of species identity and the human body assumed within xenotransplantation. The value of the deliberative processes in this case was in building understanding of contributing to a co-operative process, within the context of the inevitability of uncertainty and otherness. This built support for forms of action based on a sense of the extended ethical responsibility to human and non-human others manifest in a view of organ transplantation as a socio-material ordering of the world, as well as a medical process.

For geographers, interested in the hybrid politics of biotechnology, tracing the way these agonisms and antagonisms get revealed and resolved may mean occupying contradictory positions. This paper has highlighted the frequent recourse to modernist categories of nature and god, in both citizen and stakeholder dialogue around the new options for organ transplantation. It has further suggested it is important not to assume naming things in or against nature is inherently conservative (Castree 2004). Associations are made and remade, and strategic and cooperative forms of activity built, through deliberation and language, which is performed in contexts structured by the operation of power both internal and external to different communicative contexts. This is not a reason to withdraw from opportunities for public engagement, nor to reassert a further binary between dualistic and non-dualistic forms of thinking (Castree 2003). As Latour himself suggests, in understanding this doubly hybrid politics, a "double separation is what we have to reconstruct: the separation between humans and non-humans on the one hand and between what happens above the line [processes of purification] and what happens below

on the other [processes of translation]" (Latour 1993, p.13). Charting the geographies of biotechnology requires us to work both within and outside of the categories of modernity and hybridity, and to understand how to inhabit productively the spaces between them.

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