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Mediating Science and Society in the EU and UK: From Information-Transmission to Deliberative Democracy?

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Abstract

In this paper we critically review recent developments in policies, practices and philosophies pertaining to the mediation between science and the public within the EU and the UK, focusing in particular on the current paradigm of Public Understanding of Science and Technology (PEST) which seeks to depart from the science information-transmission associated with previous paradigms, and enact a deliberative democracy model. We first outline the features of the current crisis in democracy and discuss deliberative democracy as a response to this crisis. We then map out and critically review the broad outlines of recent policy developments in public-science mediation in the EU and UK contexts, focusing on the shift towards the deliberative-democratic model. We conclude with some critical thoughts on the complex interrelationships between democracy, equality, science and informal pedagogies in public-science mediations. We argue that science and democracy operate within distinct value-spheres that are not necessarily consonant with each other. We also problematize the now common dismissal of information-transmission of science as inimical to democratic engagement, and argue for a reassessment of the role and importance of informal science learning for the “lay” public, provided within the framework of a deliberative democracy that is not reducible to consensus building or the mere expression of opinions rooted in social and cultural givens. This, we argue, can be delivered by a model of PEST that is creative and experimental, with both educational and democratic functions.

Recent developments in the modes of public-science mediation and the shift towards public engagement with science and technology are situated within the intersection of a number of distinct developments that are largely extrinsic to the policy and practice of public-science mediation.¹ These include the ascendancy of the constructivist pedagogic paradigm in educational theories and practices; attendant developments in science education (which value inquiry, questioning, argument and the relevance of everyday knowledge); the development of a certain (to some degree media-induced) social phenomenology of a risk society; the effect of the cultural(ist) turn in received outlooks on science and technology; and—perhaps most importantly—the crisis of liberal democracy. Amid the current ambience of public-science mediation, what has not received enough scrutiny is the complex set of interrelationships and tensions between and amongst democracy, equality (formal and substantive) and science. We believe that more reflexive assessment should focus on the complex interrelationships between what are in essence discrete and arguably in some ways incommensurable “value-spheres”, in Weber’s sense (2004). These spheres are structured around three distinct sets of organizing principles: the distinct principles and practices of a) popular sovereignty and self-government; b) the need for and entitlement to the distribution of scientific knowledge as a symbolic resource; and c) science as both a social institution and the epistemic matrix for truth-values that are irreducible to the determinations of the social institution that science is, or to the subjectivities or even intersubjectivity of scientists as a “community”. The sidelining of any sustained thematization of the interrelationships of these complex and distinct spheres, it seems, is rooted in an optimistic and now largely consensual view of the unproblematic homogeneity of good values; and partly due to a presumably anti-elitist and empowering ethic vis-à-vis the dispossessed and the excluded (i.e., excluded from power resources, including techno-scientific knowledge and its applications and the decision-making concomitant with their pursuit and governance).

In this paper we critically review recent developments in policies and philosophies bearing on public-science mediation in the EU and the UK. Our discussion will touch on these framing circumstances where relevant. However, the crisis of democracy, its empirical manifestations and its theoretical understanding will receive special attention by way of setting the broader scene for the discussion

¹ A clarification of terminology is in order at the start: we will use “public-science mediation” as a generic description to refer to the whole field of activities, policies and institutional spaces that aim to “improve” the relation between science and the public, irrespective of the paradigm or model at work (known as Science Communication, Public Understanding of Science or Public Engagement with Science and Technology). Thus, public-science mediation includes the whole spectrum of these attempts ranging from what is known as the more didactic approach premised on the deficit model to anti-pedagogic approaches that see dialogue as the sole objective such activities should aim at.

of the current policy and practice in public-science mediation in the UK and the EU. This special attention is warranted by what we see as the intersection of two recent historical developments pertaining to science and democracy respectively: on the one hand, the view, codified and manifest in governmental policies, that science should not and cannot be seen as a self-sufficient pursuit of self-validating knowledge indifferent and transcendent to its social, cultural, political and economic determinations as well as effects, intended and unintended; on the other hand, the crisis of the liberal representative model of democracy, and the consequent need to invent new lines of renewal for democracy, both as critical-normative idea(l) and as creative praxis. The underlying logic that marries science to democracy runs thus: given that in a science-saturated society reasoned opinion-formation about science is critical to an effective enactment of substantive citizenship in a democracy, science and public-science mediation are seen as critical to the renewal of democracy and the energizing of its deliberative aspect within the politics-oriented dimension of civil society, i.e., the public sphere (Habermas 1992).

This paper unfolds in four steps. First, drawing on the literature in political philosophy as well as political sociology, we outline the features of the current crisis in democracy and discuss deliberative democracy as a proposed remedial move championed in many quarters in political science and political philosophy as well as policy-driven democratic reform. Second, we map out and discuss the broad outlines of recent policy orientations in public-science mediation in the EU context that echo many developments in the disciplinary space known as Science and Technology Studies (henceforth STS). Third, we critically discuss key parallel policy-driven developments in the UK context that have led to the current paradigm in public-science mediation known as Public Engagement with Science and Technology (henceforth PEST). We conclude with some critical thoughts on the complex interrelationships between democracy, equality, science and informal pedagogies in public-science mediation, putting under scrutiny in particular the now predominant view of information-transmission of science as inimical to democratic engagement, and the underlying axiological adequation predicated of the goodness of democracy, the truth of scientific knowledge and the specifically social goodness of its technological spin-offs.

Deliberative Democracy: What is it and What is it for?

Due to a combination of circumstances and factors, internal and external to the political field, there is growing evidence—and recognition—of a serious crisis in the existing mode of liberal representative democracy, as a set of institutionalized practices and as a normative framework for the business of governance. The current crisis relates at once to the sources, processes and ends of the exercise of formal political power, and is manifest in many growing symptoms; it has affected

both the facticity and validity of democracy. On the one hand, it has undermined democracy's foundational claims to enacting popular sovereignty and the protection of individual rights; on the other hand, on the ground, it has reduced the political process to a technical exercise in the management of public affairs (Rancière 1995), and simultaneously reduced the specifically democratic dimension of the political process to a periodic ballot-casting exercise. Politics as management has in turn activated the oligarchic tendencies inherent in democracy (Rancière 2007). Under these circumstances the paradoxes of democratic representation have become pronounced in that representation in effect functions in accord with the model of delegation, for those who have made the effort to vote. In effect, from the point of view of the majority of the demos, democracy is the name of little more than the voting system in place. But even the electoral aspect of democracy, taken on its own terms, has not been faring very well, partly because voters are positioned as self-interested consumer-citizens and statistical/demographic targets, and partly because of the steady drops in election turnouts. The failings of the existing mode of liberal democracy are thus located in (a) the over-reliance on representation as the means and, to a great degree, also the end of the democratic process; and (b) the inherent limits of representation per se. In addition to the fact that representation is not co-extensive with or reducible to democracy (Rancière 2006), representation has its inherent limits that often go unthought. It is prone to be reduced to a form of delegation that, as Barber (1984: 145) notes, disenfranchises the voters and "alienates political will at the cost of genuine self-government and autonomy". Further, there is the little noted impossibility of a complete fit between the representative's interests and value-laden worldview and those of the represented (who will never happen to have one uniform set of interests), in addition to the tension between representing constituency-level interests versus other interests existing on multiple planes (communitarian, national, universal, professional, etc. not to mention the personal). In a democracy that is reduced to formal representation functioning as de facto delegation, the voter, the citizen qua voter, is, as Barber puts it, free only on the day s/he casts the ballot. Even that is questionable in today's politics given the limited range of indistinguishable options available, and the ascendancy of identitarian politics that trades on—and in a substantial sense contributes to—the formation of people's pre-political "instincts" and "essences", and reduces democracy and politics to their public expression and integration. For, as Schmitter (1999: 936) notes, among the key defining features of "real existing" democracies is a "fixation with territorial representation and partisan competition for providing the only legitimate links between citizen and state".

Nor has the substantive content of democracy been done any favour by the convergence politics between the major parties that usually alternate on government in Western established democracies, which has created a situation where voters have "on offer" what is in effect a very limited range of "electoral

choices” that correspond to differences in substance. Convergence has only aggravated the situation: the rise of style politics and “spin” and the prioritization of “electability” as the main visible differentiating aspects of party-political formations to make up for the now often hardly perceptible differences in terms of distinct policy and value orientations among contending pretenders to power. Even if existing democracy were doing well on the electoral front, it would still be in need to the same degree of a dimension of democracy as “political truth procedure” (Badiou 2006) given that elections-based democratic will and opinion are by no means self-validating, and can under some circumstances be the problem rather than the answer when the only validity they have is that they happen to embody the belief of the majority or, worse, the subtle dictates of a pre-political consensus mediated by a communitarian ethos of one form or another.

This has prompted many attempts in democratic theory and even practice to formulate alternative models of democracy capable of overcoming the undemocratic tendencies of the minimalist liberal model of representative democracy. These attempts have a long history and go at least as far back as Rousseau in modern times (Rancie`re 2006). And in more recent developments over the last three decades or so the search for an alternative mode of democracy has taken on different inflections: “developmental”, “participatory” or “strong” democracy (Goodin 2008: 2); these developments in democratic theory have culminated in what is now known as “the deliberative turn” in theories of democracy (Goodin 2008; Dryzek 2000). The central claim of the deliberative turn is that the failings of liberal democracy and its legitimation deficit can be remedied through activating the deliberative dimension of democracy that has been sidelined by institutionalized politics. Despite the now already multiple and divergent emphases in conceptions of deliberative democracy, there is a core set of distinctive normative axioms that, following Parkinson (2006), can be summarized as follows: a) the necessity for democracy of reasoning amongst people “as the guiding political procedure” (with reasoning opposed to bargaining among competing and aggregated interests and private preferences); and b) the publicness of the pivotal action in politics: namely, engaging in uncoerced reasoned deliberation with other citizens (as opposed to the privateness of voting). Thus, a substantive—as opposed to merely formal/procedural—democracy now increasingly depends on the extent to which informal inputs are obtained from a vibrant public sphere where “mini-publics” (Goodin 2008) engage in reasoned deliberation within “the informal public sphere”—as opposed to “the formal public sphere” centred around parliamentary politics (Habermas 1996: 307–308). This, it is argued, will provide opportunities for “opinion-formation” and “will-formation” (Habermas 1996) that can supplement those taking place within formal parliamentary democracy and make up for their deficiencies, and thereby enhance an active model of democratic citizenship. With the deliberative turn, as Dryzek (2000: 1) notes, “democratic legitimacy” is now primarily about

the ability or opportunity to participate in effective deliberation on the part of those subject to collective decisions ... The essence of democracy is itself now widely taken to be deliberation, as opposed to voting, interest aggregation, constitutional rights, or even self-government.

In other words, democratic legitimacy and a sufficiently legitimated political process, as Habermas would argue, now more than ever before depend on redressing the balance between system and lifeworld, and engineering local, lifeworld-based and lifeworld-oriented deliberative sites where the potential of public rationality can be actualized through an open-ended democratic intersubjectivity.

Critical to conceptions of deliberative democracy is thus an anthropological view of public life that gives primacy to a certain spontaneous vernacular rationality that is both instrument and effect of communication, both the core fact of social life and potentially a regulative matrix for the good social life. The deliberative turn in democratic theory, to that extent, owes a great deal to Habermas's discourse ethics and his attempt to re-ground rationality in what he posits as the necessary and universal normative core of spontaneous everyday communication—and the totality of communication as coextensive with the species-being of humans. He thus grounds rationality not in subjective attributes or even normal actions of the archetypal individual (of liberal political philosophy), but in the communication-dependent intersubjectivity presupposed by every experience and enactment of subjectivity. Habermas founds this universal rationality on the mundane and (often implicit) validity claims that inhere in every instance of communication as an enactment of intersubjectivity: these are claims to truth, truthfulness and rightness. For Habermas these are the irreducible and necessary validity claims that we all make when we communicate: claims to truth, truthfulness and rightness are made every time communication occurs. Even in instances of disagreement or deception these claims are not undermined, but they constitute the conditions of possibility for making successful deceptive statements or for viable disagreement. However, as will be discussed later, unlike Habermas's discourse ethics as the regulative framework for a democracy that consists of what he calls action oriented towards reaching agreement/understanding (*Verständigung*), the type of deliberative democracy that we will argue PEST should be oriented to is one that does not normatively commit itself—in advance of the empirical situated singularities—to consensus-building regulated by a priori norms that can limit the creative potential and responsiveness of PEST activities.

In principle, deliberative democracy, we argue, has the potential to go some way towards renegotiating the balance of power between the demos and what Rancière (2007) calls the oligarchic elite of democratic government. Reasoned and open deliberation has the potential to embed an interpersonal lifeworld-based

dimension and act as a countervailing force to procedural macro politics (De Greiff 2000). Deliberation can thus enhance a minoritarian politics whose issues, concerns and perspectives do not feature on the majoritarian public agenda²: either because the statistical majority for some reason or another fails to take on board or empathize with these perspectives, or due to the inherent limitations of quantitative democracy (including its paradigmatic dispositif of the opinion poll which offers surface-level responses within pre-determined templates that can act on public opinion, rather than simply “represent” it), or due to the structural forces that bear on the democratic process and that, as Dryzek rightly notes, set “severe constraints on what is possible in terms of both the content of public policy and the degree of democracy that can be tolerated in the state’s production of policy” (2000: 21). Deliberative democracy will not necessarily empower ordinary citizens in the formal-legal sense, but can help people acquire a sense of belonging in actu to a civic collectivity—as opposed to an administrative form of belonging—as well as acquire knowledge and deliberative skills by virtue of engaging in the process. It can contribute to a citizenship competence conceived “not [as] a function of state-derived status but rather of learning-through-participation” (Stewart 2002: 482), as opposed to the classical-liberal model of citizenship where deliberation/participation “expresses” a pre-political identity rooted in socio-cultural membership and the political interests and preferences assumed to be consubstantial with the givenness of this membership (Rancière 2007). The deliberative model of citizenship, in contrast, “proposes that participation normatively should and empirically can change or modify preferences in relation to perceived and pursued political interests” (Stewart 2002: 476).

Therefore, citizenship, within the deliberative frame of reference, is no longer cast in the mould of what Smith (1997) calls “ascriptive citizenship”; it is not reducible to, nor even derivable from membership of a political community or of a social “station”, or even an a priori normative set of traits and qualities. Citizenship becomes the name not for a status, set of rights, attributes or qualities conferred by the state, but for certain modes of acting in the public sphere. Hence

² Here the use “majoritarian” and “minoritarian” has nothing to do with belonging to a statistical minority defined according to one axis of “identity” or another, as opposed to a statistical majority, though it may coincide with this statistical distribution. We use “minoritarian” in Deleuze’s sense to refer to “a non-denumerable set” (Deleuze and Guattari 2004: 513) or an ensemble that acts and thinks in ways that cannot be classified or accommodated into the existing dominant norms of political practice, and thus into the empirical gamut of normed political practices. This is what Rancière calls the count of the uncounted: “The people [demos] is a supplementary existence that inscribes the count of the uncounted, or part of those who have no part—that is, in the last instance, the equality of speaking beings without which inequality itself is inconceivable” (Rancière 2010: 33).

the relevance and potential input of the PEST field into deliberative democracy — by virtue of PEST’s location within civil society as a cultural milieu that is well-positioned to incorporate, relay and enhance deliberative democracy as norm and praxis. A democratized/democratizing PEST offers the potential to facilitate “micro-deliberative forums” (Goodin 2008) without seeking to sell one policy line or another (which is not to say that PEST can ever be apolitical). This unique position as a cultural space autonomous from formal politics and offering people the chance to learn about and make an input into politics/policy of science and technology through deliberative democracy is a resource that PEST should explore to embed itself within local civic spaces and to support the experimental development of deliberative democracy.

However, despite the in-principle substantive value of deliberative democracy and PEST’s potential within it, we should not overlook the possible abuses and derailments of the deliberative-democratic content of PEST. There are some well-founded reservations about somewhat too optimistic views of deliberative democracy as an unproblematic good heralding a new impetus for democratic organization, without enough attention given to possible distorting effects of interest and partisan organizations that can mediate deliberative-democratic events (Hendriks 2006). Thus, a critical and vigilant approach to deliberative democracy in and via PEST is needed; one that views deliberative democracy in general, including in PEST, as a desirable prospect whose enactment is likely to fall short of meeting its hopeful formulation, not least because of the discordances between the organizing axioms and conditions of democracy and scientific knowledge, and the distinct imperatives they engage: an ethic of open (interpersonal) communication (in Habermas’s sense) versus an ethic of (impersonal) truth (in Badiou’s sense), however partial and provisional that truth might be, provided it offers “the present-best” propositional knowledge (Norris 2005).

Theoretical debates around deliberative democracy did not go unnoticed by political and civil society organizations. There have been many experiments with staging public-sphere informal settings where deliberations of mini-publics can take place. Examples include: Citizens Juries in the UK and Canada, Planning Cells in Germany, the Danish model of the Consensus Conferences and deliberative polls, twenty-first century Town Meetings and National Issues Forums in the USA. These experiments have involved a mix of organizational techniques, including bringing mini-publics together with experts and policymakers in weekend forums whose outcomes are widely reported in local and national media (especially in the Danish model), with some documented cases of influence on policy- and decision-making processes within macro-political institutional contexts (Goodin 2008). The UK Government’s Green Paper “The Governance of Britain” stresses the necessity for rejuvenating the democratic process by embedding debate, deliberation and even decision-making in everyday

encounters within locally based civil-society contexts to “foster and harness community voices on important issues of public policy” (House of Commons 2007: 48). The policy-driven attempt to develop a deliberative dimension to local democracy has been echoed in PEST policies, both across the EU and in the UK.

The EU Research/Policy Context

The 2000 Lisbon Agenda announced the EU’s strategy to facilitate Europe’s transition into a full-fledged and efficient “knowledge-based society” by 2010 (Council of the European Union 2000). Science, not surprisingly, is portrayed as central to achieving this vision. Underlying this vision seems to be the assumption that science, quite apart from its conduct, technological instrumentalization and its social consequences, will have happy knock-on effects on public rationality and vernacular modes of reasoning and acting (Wagner 2007). The aim is to coordinate an EU-wide approach to science, science education and public engagement with science, rooted in the premise that science is consubstantial with “European modernity”—assumed to be a pleonasm. There is thus assumed to be enough of a deep-seated and latent scientific essence cutting across “the imagined community” (Anderson 1991) of Europe to warrant and sustain an EU-wide science and public- science mediation policy that transcends country-specific peculiarities. The second feature that marks the EU-wide approach is what can be described as the relational view of science: steering and engineering ways in which science—as both an epistemic and institutional space—relates to a set of spheres posited as external to it, such as politics, ethics, the environment and economics. This is modeled on the “science and ...” formula: science and society, science and education, science and citizenship, science and politics etc.—all of which have been major concerns within EU policy contexts.

The discussion of the EU context will revolve around two major reports to the European Commission written by two expert groups whose make-up included many leading STS scholars. The Reports aimed to inform the EU science and society policies, and to provide a research-validated grounding for them. The Reports occupy the intermediary space between an STS-dominated scholarship and the EU policies on science-society mediation. The first, entitled *Taking the European Knowledge Society Seriously* (European Commission 2007), was produced by the Expert Group on Science and Governance, and the second, entitled *The Global Governance of Science* (European Commission 2009), by the Expert Group on Global Governance of Science. Both reported to and were commissioned by the Science, Economy and Society Directorate, one of the bodies directly under the Directorate-General for Research of the European Commission. What is striking about these two reports is that they were written by an international team of some leading figures in STS whose names have been associated with what can be described as the values-turn or cultural turn in the

disciplines of the sociology and history of science.

Taking the European Knowledge Society Seriously (European Commission 2007), as the title indicates, situates itself as a continuation of the Lisbon Agenda and thus incorporates many of its organizing principles (Council of the European Union 2000). The Report also aims to reflect on and depart from the inadequacies of previous visions and policies, especially with regard to conceptions of the nature and dynamics of scientific knowledge, mediating between science and non-expert lifeworlds, and the public as a construct. The 2007 Report is driven by three major concerns: first, the general unease with science and its products; second, the democratization of the governance of science; and third, addressing topical and controversial science-related issues. The Report emphasizes the need to address the widely felt unease and distrust towards science and the scientific establishment against the backdrop of heightened awareness of risks linked to new technology products whose invisible effects are yet to be known. This tied in with the broader ethos of what Beck (1992) describes as the risk society. The Report sought to address the questions and obstacles standing in the way of a more substantive public engagement that is not reducible to a legitimating exercise for political decisions or for what scientists decide to do. The Report also recognizes the inadequacy of existing ways of constructing what is commonly described as the “public”.

What distinguishes the 2007 Report from previous EU policy documents is a view of science that emphasizes the necessity of taking on board the inevitable value-base of science. It acknowledges how values inhere in all aspects of the conduct of science: its funding, planning, governance, the research process, its outcomes, applications and impacts on society, all of which are closely bound up with “normative structures”. In parallel, there is a consistent recognition of science-related issues that cannot and should not be reduced to technical questions (e.g., statistical, impersonal risk assessment exercises), but whose treatment requires grappling with the value-base of scientific research, science policy and instrumentalizations of science. There is a sense in which the Report tends to come across as a policy manifesto for coming to terms with normative questions by policymakers, scientists and science communicators. It calls for “learning normative deliberation”, in a departure from what is seen as a positivistic linear view of science policy and the scientific process, which is built on “the assumption that expert discovery can reveal objective truths, which then determine proper policy, and that democratic input is valid only after factual truths have been revealed” (p. 11). It is the view of public engagement with science as an after-the-event affair that the Report seeks to depart from by moving public engagement “upstream”, and by making the process coextensive with the various aspects of scientific practices and the institution of science. Public-science mediation is thus no longer about “post-innovation”, “downstream” or “output questions”; it should be

concerned with the inputs (including normative conceptions of purpose, aspirations, needs and priorities of different social and cultural voices and groups) that ought to steer scientific research and policy in the first place.

Overlapping with this principle is an instrumentalist image of science, or more precisely a heteronomous view of science: science is no longer seen as an “Independent Republic”, as the Report puts it, that can be, or should be, allowed to remain autonomous and indifferent vis-a`-vis the imperatives of its social, cultural, political and economic milieu; a rarefied space of knowledge production that works best when left to its own autonomous epistemic criteria. Science is best seen, according to the Report, as a servant to innovation, the knowledge economy and ultimately social and economic well-being. This instrumentalist view of science as a heteronomous service/servant reinforces the argument that engagement requires more than getting end-users/citizens involved in information-transmission events and debate either for the sake of lifting the scientifically illiterate public out of its illiteracy or for the sake of (deliberative) democracy as an end in itself. This view requires that public engagement be moved “upstream” to have a formative impact on decision- and policymaking affecting scientific research, and to make an input into its governance at all levels and stages and maximize relevance and outputs for the public (Wilsdon and Willis 2004).

How these principled and well-meaning pronouncements can translate into reality is left under-explained in the Report. The question of what is to be done when the values of science are at odds with the values of democracy also receives little attention, because science is denied any values immanent to it. Indeed, underpinning the Report, and more generally underpinning the values-turn in social and historical studies of science, is the idea that science has no values; that there are no scientific values; there are only values driving the conduct of science, and thus its ostensible truths. To that extent, values are in effect counterposed to a value-free science, a science that has no values of its own. In the Report science figures as a terrain receptive and prone to value investments coming from without—essentially exogenous values (emanating from the interests of individual scientists, scientists as a group, political interests, economics, etc.). With the values-turn in science and society policy and research, there are no values of science; there can only be values for science. In any case, the Report’s own version of the values for science seems to be informed by the legitimacy imperative on the part of the powers that be. This drive can be glimpsed in what the Report sees as the overriding anxiety arising from public unease with science:

The place of science, or better, technoscience, as a key agent of governance and government, able both to enlighten, and to generate public legitimacy for democratic policy commitments, is seen as seriously weakened by this public unease. (p. 13)

With the more recent Report *The Global Governance of Science* (European Commission 2009), the theme of governance takes centre stage more explicitly; and thus the emphasis has shifted in some ways: the deliberative slant on public involvement with the conduct of science policy is subsumed under the umbrella of the governance of science. Deliberative democracy is thus framed as a means of managing public affairs—not an end in itself; or, as Negri would argue, as a regime of constituted power, and not a dispositif of constituent power (Negri 2009). The 2009 Report is the as of yet strongest expression of the EU's advocacy of what Irwin (2006) describes as the new scientific governance. The crisis in public-science mediation as well as “the crisis of trust in science” are reframed as essentially “a crisis of governance”. The shift to the language of governance, as opposed to government, as Wright (2008) notes, is laden with benign overtones embedded within a set of discursive practices that seek to reduce government to a minimal orchestrating role vis-a`-vis the good steering of polity without government, and eventually of policy without politics. The governance of science thus suggests that the conduct of scientific conduct—to echo Foucault—is one that involves distributed steering, managerial and participatory mechanisms that cannot be seen as concentrated within a central locus of governmental power. The limits and possible pitfalls of deliberative governance in science are recognized only to be ascribed to the fact that science-related deliberative-democratic engagement should be embedded within governance per se. It admits that

the take-up and success of these deliberative experiments has nevertheless been patchy. One clear lesson learned from experience so far is that such initiatives need to connect better to real governance decisions. (European Commission 2009: 27)

The 2009 Report has reinforced the now official line on science as necessarily bound up with values; science not only is traversed by values but can also work as ideology—in the strict sense of the term—to obscure normatively structured decisions that are presented as technical operations: it is “often also a vehicle for introducing (while obscuring) normative decisions that deserve to be debated on their merits” (European Commission 2009: 27).

The crux of the problem follows from collapsing science into science policy. To say that the direction of a certain programme of scientific enquiry is shaped by interested and ideologically invested policies says nothing about the truth-value of the science per se, about the worth of that research based on the values of science, in much the same way as the irrational elements of what Popper calls “the context of discovery” for a given scientific theory has no implications whatsoever for its context of justification (Popper 2002). The Report thus echoes some of the currently dominant and overstated views emerging from the STS field: namely, science is but a form of ideology or belief amongst others, and its truth-value is a

function of its dominance and recognition as science (Barnes et al. 1996; Collins and Pinch 1998; Knorr-Cetina 1999). This is, paradoxically enough, a fairly ideological view of science as it not only oversimplifies the picture to a remarkable degree, but also promotes the professional interests of STS players.

In parallel, the theme of access and inclusion is brought into play, though in ambiguous terms. The problem identified is essentially one of a science that lacks openness and access—both taken as two constituent features of science. It is, however, important to look more closely at the concept of openness that is predicated of how science should be conducted. The first thing to note is that there are two completely different types of openness that are conflated: what can be described as epistemic openness and openness as institutional openness. The conflation is quite manifest in the following passage:

From its eighteenth century origins, the society of science has made claims to openness. Science, unlike politics or religion, claims to engage with the physical world, to discover the way it really is. It also aspires to be open to membership without class, national, religious, ethnic, or sexual prejudice to anyone able to undergo the appropriate initiating apprenticeship. Science has, of course, often failed to live up to its ideals. It can dogmatically function as an ideology that excludes some forms of knowledge. (European Commission 2009: 24)

Here, there are two exclusions at work that are conflated: a) the institutional exclusion, or the exclusion of some (or groups of) people from the institution of science; and b) the exclusion of other forms of knowledge, or the epistemic exclusion of forms of knowledge or beliefs that are classified and labeled as unscientific. The problem is that the two exclusions have little to do with each other; the first is socially “overdetermined”, the second is scientifically overdetermined to the extent that it is an effect of the operation of an axiomatics of scientific practice at a given time, which is of course not without its social effects as it aims to mark the boundary conditions for the constitution of science as a distinct space of human endeavour, and to that extent science as a field in Bourdieu’s sense (Bourdieu 2004). Now the point is that the first exclusion can be remedied with some form of democratization of the boundary separating out science as a social institution, and scientists as a professional interest group, from their outside. The second, however, is not necessarily commensurable with democratic reason and is in a sense both indifferent and resistant to democratization (the more advanced, the less accessible—or what comes down to the same: the more advanced, the more exclusive and anti-democratic). The development of scientific knowledge has been amongst the most undemocratic historical phenomena, especially in relation to non-scientists, with boundaries and high entry thresholds, esoteric and formulaic language and, perhaps most importantly, the axiomatic opposition—which Bachelard (2001) emphasizes as

one of the conditions of possibility for scientificity—between science and opinion, or episteme and doxa in Plato’s terms.

The presumption thus is that it is scientific to “open access to science”, and if science is not accessible, the reasons and causes are to be sought in science as an institutional practice as well as the interested investments in science and the utilizations of its products. Here we encounter yet another conflation of two separate notions of access: access to scientific knowledge per se by other scientists, especially located within different national and geo-political contexts; and access to scientific knowledge by the public of non-scientists. The Report states that: “economic networks and cultural prejudices have limited participation in science among underprivileged groups”—i.e., have restricted these groups’ access to participation in science; this is the first meaning of access, whose answer could be the democratization of science as a site within the public sphere, or in Balibar’s phrase (2004), as one of the key emerging worksites of democracy. The 2009 Report immediately goes on to contrast a scientific ideal of openness to the existing notion/ practice of openness as defined around access, openness and exclusivity in legalistic terms and with reference specifically to intellectual property rights:

Yet the ideal of openness remains a dynamic force that has influenced the historical development of the society of science and continues to be manifest in such diverse forms as the ‘open society’ of Karl Popper and the open software of computer scientists. The concept of open access to scientific knowledge is but another peculiarly salient manifestation of a perennial scientific ideal within the scientific community. The concept of open access focuses reflection on the issue of who controls access to scientific knowledge and by what means. Much of the debate takes place around the question of online access to scientific publication in an era of ubiquitous information. But of special concern is control of this access by legal means that assert some kind of property rights over scientific information, normally referred to as intellectual property rights (IPRs). (European Commission 2009: 24)

Thus it appears that, arguably, the issue of governance is essentially not one of how to democratize access to science and turn science into a worksite of democracy, but one along the lines of: given the transnational flows of scientific knowledge and information, how can access and openness to scientific knowledge be maintained within a binding legal framework that transcends the jurisdictional sovereignty of nation-states? How to ensure an enactment of the trade-off between the sharing of original knowledge production across national borders in return for ensuring patent- related property rights? In other words, far from showing any concern with openness in the sense of inclusivity and democratization of participation in steering the conduct and effects of techno-science, this aspect of

governance essentially aims to argue for the necessity for transnational anti-piracy policies in return for more liberal yet regulated flows of scientific information. This is summed up in the following statement:

Patent law aims to promote innovation and the rapid dissemination of its associated knowledge. The inventor gets exclusive rights to control commercial exploitation of inventions for some years and in return discloses detailed description of the invention, opening up the new knowledge to all. (European Commission 2009: 24)

The Report, however, alludes to yet another aspect of the crisis that underpins its vision, which does not sit very comfortably with its view of science as value- and ideology-laden: a crisis in deference to science and entrusting oneself to the esoteric wisdom of the few knowers; it is stated that “[t]he loss of deference to expertise reinforces the need to construct new models of governance for a more sceptical age” (European Commission 2009: 27). This is the image of public engagement and deliberative governance of science as in some sense the management of public skepticism, a crisis-management technique, rather than a vehicle for lending some substantive content to the existing hollowed-out version of formal majoritarian democracy, and as a means for democratizing science policy and affording a space for the performative development of citizenship. Deliberative democracy for the governance of science is thus seen as necessitated by the “loss of deference”, with the brief of making up for this deficit in deference to the cultural and social authority of science—as knowledge, as application, as an institution and as a service provided by a professional group that used to enjoy a great deal of autonomy that had shielded it from public scrutiny as well as from a direct instrumentalist calculus, and had bestowed on it a halo of deference.

Despite its confident tone about what ought to be done to democratize science policy and governance, the 2009 Report is at pains to reconcile the two distinct and competing values of democracy as deliberation and governance as efficient well-legitimated management; on the other hand, to reconcile the de facto governance of science as inevitably and indeed intractably global, overflowing the bounds and jurisdiction of EU both as discrete nation-states and as an integrated geopolitical bloc, with the imperative of embedding deliberative democracy within the governance of science. It simply notes that “[w]hat global deliberative governance might look like nevertheless remains unclear”. It thus skates over complex issues that relate to a) the universalism of science within the epistemic value-sphere (or its strong claims in that regard); and b) the increasing subordination of science to technology—to instrumentalizations whose production, circulation and consumption, driven by global capital, are not completely under the control of nation-states or even strategic cross-national

blocs. The Report then takes the easy way out through the multiculturalist route, through some vague reference to the tricky possibility of working out some common ground for cross-national/cross-cultural coordination of the governance of science. It states:

Across the world, we can expect such divergences to be magnified. Countries outside Europe will have different governance approaches and science in each country or culture will fit into different contexts. As science globalises, and the need for global governance looms larger, we therefore need to consider some of the myriad contexts of global science within global society. (European Commission 2009: 28)

In the recommendations, and specifically in the one that bears directly on what is described as deliberative governance, the Report makes it even more ambiguous whether the push for deliberative governance is about democratization of science policy, or more about a mode of management of science affairs cross-nationally that can serve to bring the rising science powers under some multilaterally binding regulatory framework. The recommendation goes:

The European Union should seek to extend to the global level of its leadership in working to harmonise the internal and external governance of science across national boundaries—by furthering research and discussion on the global governance of science and seeking to develop appropriate protocols and their application for global collaboration. (European Commission 2009: 43; original emphasis)

Here, there is a concern with mainstreaming the EU's mission to drive and lead international regulation of science as a socio-political institution; there is an assumption about "disharmony" regarding the existing modes of governance cross-nationally; and there is no explicit mention of deliberative democracy in the recommendation; "discussion" is as close as the recommendation gets to the notion of "deliberative governance" which was emphatically flagged up in the Report, although discussion in the quote above seems to refer to discussion between nation-states or between the EU bloc of nation-states and the rest of the world.

The UK Policy Context

As Bauer et al. (2007) note, from the 1960s scientists withdrew from the media while the public was alienated by the domination of science reportage by specialist science journalists. Engaging in public science was thought to be not only a time-consuming task of little consequence, but also detrimental to a science career—what matters most are one's peers' assessment and recognition. This happened against the background, and to a great degree because of, the circumstances of the

Cold War environment. Bensaude-Vincent (2001) shows how the massive gulf between science and the public, and between science and public opinion, is a relatively recent thing and is by no means coextensive with the history of modern science. She dates the split and opposition between science and (public) opinion to the mid- twentieth century dominance of physics, and nuclear physics in particular, and the culture of secrecy that surrounded it during the Cold War, which alienated the public from science and instituted a distance between science and public life.

The development of PEST has been incremental, and its precursor in the UK dates back to the mid-1980s. Since the 1980s policies have attempted to change the relationship between science and the public in three ways on the basis of three corresponding interrelated principles: first, through attempting to bridge the gulf between the scientific establishment and the public to facilitate science literacy; second, by ensuring a degree of transparency and accountability to the public with respect to scientists' work; and third, through attempting to ensure that taxpayers, as funders for scientific research, are involved in setting the priorities and directions for science, leading to both a value-for-money science for the taxpayers and securing an element of democratic legitimacy for both scientists and science policymakers.

The Bodmer Report

The 1985 Royal Society Report *The Public Understanding of Science* (Bodmer 1986), known as the Bodmer Report, marked the inaugural formalization of policy- sponsored Public Understanding of Science (henceforth PUS) activities in the UK (Miller 2001). The Bodmer Report has received ample attention and analysis, and still remains a watershed and formative document that “haunts” subsequent attempts to follow it or go beyond it. Here, we focus specifically on the implications for democracy of the Bodmer approach to the publicity and publicness of science, as political, professional and pedagogic practice. The Bodmer Report was to define the terms of the debate for the following decade or so, and it presented a programmatic vision of what came to be known as the PUS paradigm in the mediation of public-science relationships and was followed by a flurry of qualitative research from STS scholars exploring and eventually condemning the PUS vision (Irwin and Wynne 1996). The link to democracy is framed thus:

In a democracy public opinion is a major influence in the decision-making process. It is therefore important that individual citizens, as well as the decision-makers, recognize and understand the scientific aspects of public issues ... Wider understanding of the scientific aspects of a given issue will not automatically lead to a consensus about the best answer, but it will at least lead to more informed, and

therefore better, decision-making. (Bodmer 1986: 10)

Weber's (1978) concepts of legitimation and rationalization are pertinent here and useful in unpacking what the Bodmer Report was trying to achieve and where it was coming from. The aim was to inform public opinion such that the governance of science is better legitimated and rationalized, with the ultimate aim being to facilitate the conduct of science. The information is to be fed to both citizens and policymakers with a view to legitimating the exercise of political authority over the management of techno-science; and simultaneously to policymakers with a view to achieving a degree of rationalization of the exercise of authority in government and public office. Here, it is arguably the rationalization of politics as management of public affairs that is at stake; or the rationalization of democracy in so far as it serves as a means of governance. The Bodmer Report, in essence, tied in with the 1980s New Right ethos of subjecting public services and publicly funded institutions to accountability mechanisms whereby they would have to justify their existence and their value-for-money for the public of taxpayers.

In terms of its pedagogic import and implications, the Bodmer Report states:

Ignorance of elementary science cuts off the individual from understanding many of the tools and services used every day... those who have never been stimulated to enquire about how things work and who lack the basic knowledge to pursue such an enquiry are surely at a disadvantage in the modern world. Scientific literacy is becoming an essential requirement for everyday life. (Bodmer 1986: 10)

This captures what is now commonly known as the deficit model in PUS. The deficit model's flaws have triggered ample critical analysis (Gross 1994; Miller 2001); we will therefore limit our discussion to a few observations that will help frame subsequent developments that led to PEST. The organizing premise of the deficit model is centred around the idea of, as Gross (1994) succinctly put it, "public deficiency, but scientific sufficiency". We would like to point out two key presumptions that will resonate with our subsequent discussion: (a) the harmony between distinct and even incommensurable "value-spheres" (Weber 2004); (b) opportunities to learn about science-for-everyday-life are available on a level playing field. The deficit model is built on a series of equations and displacements between and across distinct planes that correspond to distinct "value-spheres". These can be summarized as follows: science is good for the public; understanding is what the public needs to latch on to the goodness of science as well as its truth- value and to make science democratically sustainable. Therefore, PUS as a remedial formula is predicated on the presumption that understanding science (epistemology) and capturing its goodness and potential

contribution to well-being (consequentialist ethics) will result in both respect and love for science (affectivity) and its legitimation (politics). Equally important, another premise of the deficit model which does not seem to have received enough attention—exemplified in the quote from the Bodmer Report above—is the presupposition that scientific knowledge is readily available to everybody on equal footing, and that most people do not make enough effort to find out and engage in some form of self-directed literacy necessitated by their existence in a society where the products of technoscience are pervasive. It is built on an equal-opportunity model of access to science; and an implicit explanation of scientific illiteracy as self-exclusion or apathy towards the existing science learning opportunities.

The 2001 House of Lords Report *Science and Society 2000* (PSCST 2000) was commissioned and published in response to the science scandals and the attendant legitimation crisis of scientific research and policymaking (Felt and Fochler 2008). These created the initial impetus for mainstreaming public-science mediation into government policy with a view to democratizing science policy and countering the communication crisis in the wake of the BSE and GM crops debates (Irwin 2006). *Science and Society* attempted to reframe science as a value-driven enterprise populated by scientists and policymakers who have their own values which should be acknowledged and brought into debate. However, what it has in common with the Bodmer Report is its conception of the role of science in society: science as an instrumentalist project to be submitted to an assessment primarily in terms of its utility. In parallel, the Report is underpinned by the idea that in British society science and technology have permeated every aspect of people's everyday lives, whilst science is linked, rightly or wrongly, to actual and potential disasters. Therefore, public engagement with science should become integral to the substantive content of active citizenship as individuals' participation in the democratic process requires the ability to arrive at informed reasoning and judgement about science-related issues; just as it requires scientists to be party to the dialogical process whereby opinions about science are negotiated and formed.

The Report is premised on a view of the historical trajectory of the relation between science and the public in many ways akin to the historical accounts of Bensaude-Vincent (2001), Weigold (2001) and Logan (2001) who argue that the gulf between science and the public is a recent thing. The Report notes:

The golden age of popular science was surely the Victorian era, when Faraday lectured at the Royal Institution and the Great Exhibition led to the establishment of the national museums in South Kensington. (PSCST 2000)

The mainstreaming into government policy of promoting more democratized ways of increasing the public understanding of science was driven by the

communication crisis, confusion and even misinformation surrounding, amongst other science related issues, the BSE and GM crops debates throughout the 1990s, which aggravated to a considerable degree the climate of mistrust by the public towards the scientific establishment and the science policymakers (Irwin 2001; Miller 2001). Public mistrust creates a legitimation crisis for both the scientific establishment and the government in a representative, liberal democracy; it throws into crisis the legitimacy claim of the rationality of what Habermas (1970) describes as the “scientization of politics” whereby policymaking processes become subordinated to the wisdom of a handful of unelected experts who indirectly determine policy orientations from a presumably interests- and ethics-free standpoint. The Report thus states:

[P]ublic confidence in scientific advice to Government has been rocked by BSE; and many people are uneasy about the rapid advance of areas such as biotechnology and IT—even though for everyday purposes they take science and technology for granted.

The values-turn in science policy articulated in *Science and Society 2000* clearly relayed into policy some key arguments coming from STS-type constructivist and sociological approaches to science (Irwin and Wynne 1996; Irwin 2006). However, what it has in common with the Bodmer Report is its conception of the role of science in society: science as an instrumentalist project to be assessed primarily in terms of its utilizations (rather than its self-referential epistemic criteria of its distinct value-sphere). The crucial differences between *Science and Society* and the Bodmer Report lie in the former’s take on the nature of deficit, its promotion of dialogue (in place of deficit-oriented activities) and, perhaps most importantly, its coming to terms with values in the conduct of science and technology as a result of a wealth of STS research which forced driving values to be recognized in this way (McNeil 2007). *Science and Society* thereby formally marked the values-turn in UK public-science mediation policy (although “values in science” had been a longstanding theme in STS and here we see it as an STS “truth-effect” in the Foucauldian sense (Foucault 2002)). The emphasis was no longer placed on public deficit with regard to scientific knowledge and understanding. Rather, *Science and Society* stresses a deficit of public “trust” in science and science policy, which it regards as only reasonable in light of the series of science-related scandals. To that extent, the deficit is located within the science scandals—their causes, effects and how they were handled by scientists, the media and policymakers. Another manifestation of deficit is framed around the lack of “dialogue”, which is conceived as the missing two-way bridge between public values/opinions and the world of science and policy. Thus was deficit reframed to include scientists’ own inability to communicate their science in accessible, dialogical and engaging ways. To this extent, *Science and Society* was in a sense a manifesto for an “engagement” approach to PUS which is

underpinned by a deliberative-democratic orientation.

As a result, PEST became integral to three parallel processes: the substantive content of active citizenship as individuals' participation in the democratic process requires the ability to come to reasoned/informed opinions about science-related issues; democratic sustainability and legitimacy for science; and, ultimately, creating the right conditions for the efficient conduct of science. The remedial response to this deficit in public trust thus centers around dialogue and dialogue-based work techniques, including national and local public consultations, polling, consultation panels, citizens' juries, consensus conferences, internet dialogues and foresight programmes (PSCST 2000). Dialogue between scientists, policymakers and the public, the Report argues, ought to take place earlier in scientific and policy processes, going so far as to suggest that, rather than one-off activities, dialogue events ought to be embraced as part of a cultural shift in the relation between science and society. Prefiguring the EU's Report that appeared 7 years later (European Commission 2007), Science and Society placed an expectation on PEST to take on board value-based questions within an open two-way dialogical process that is not simply an after-the-event informative or even deliberative occasion but is coextensive with the process of scientific research. However, there is some ambiguity regarding the role of deliberation which gives away the underlying concern with securing propitious conditions for an efficient conduct of science, because dialogue will "help the decision-maker to listen to public values and concerns; and they give the public some assurance that their views are taken into account, increasing the chances that decisions will find acceptance" (PSCST 2000). It is clear here that the efficiency imperative is getting the better of the democratic credentials in this statement: the aim is to create the procedures whereby, through listening, the decision-maker both reassures the "public" and gets their acceptance for something that has already been decided. In the same vein, it declares: "Our call for increased and integrated dialogue with the public is intended to secure science's 'licence to practice', not to restrict it [original emphasis]". Clearly, deliberation here is cast in the mould of a consensus-building exercise.

In terms of its pedagogic import, the new paradigm in public-science mediation seems to be in many ways a by-product of the shift in educational theories away from a didactic pedagogic mode built around the organizing oppositions of knowledge versus ignorance, classroom universal knowledge versus home context-dependent common sense, teacher versus learner, analysis versus narration, explanation versus utilitarian perception, etc. To a great extent echoing the impact of the belated discovery of Vygotsky, pedagogical and learning theories have sought to positively revalue common sense everyday experiences and knowledge as socially situated and continuous with classroom knowledge (expert knowledge relayed by expert transmitters), and thus offering the potential to be

used as a platform for scaffolding more effective and inclusive learning experiences (Aikenhead 1996; Cunningham and Helms 1998; Kelly 2000; Snively and Consiglia 2001; Barton 2002). This pedagogic approach is framed in a constructivist language that clearly resonates with what had by then become an established paradigm within STS (Woolgar 1991; Michael 2002).

While *Science and Society* remained the key UK policy document on public engagement between 2000 and 2010, government development of and financial commitment to PEST can be located in a number of documents that have appeared in the wake of *Science and Society*, with a range of implications. Public engagement appeared most explicitly in documents and projects directly concerned with government-led public engagement, with thematic foci around nanotechnology or genetically modified organisms, for example (The GM science review panel 2004; HM Government in consultation with the Devolved Administrations 2005), in ways that, while coherent in terms of delivering public dialogue in accordance with the overarching concepts of *Science and Society*, have been critiqued as instrumentalist, although this is exemplary of how contemporary science and society relationships are configured (Irwin 2006; Wynne 2006). Public engagement also features as a significant focus in several policy documents concerned with science funding, such as *The Forward Look* (OST 2003) and the *Science and Innovation Investment Framework 2004–2014* (HM Treasury and DIUS 2007), both of which present public engagement with science in terms of safeguarding and fostering innovation through promoting public trust in science, terms more akin to those found in the older PUS rationale. The link between science funding and public engagement is made more overtly by the Parliamentary Office for Science and Technology (POST) describing the concerns of public engagement as revolving around “[t]he science to be funded, how it should be carried out and how it should be used and regulated” (POST 2006: 1). The presence of “public engagement” as a term in economically oriented policy documents, albeit a term prefacing attitudes similar to those found in the PUS movement, speaks to the increased salience of that term and related notions in the UK during the first decade of the 21st century.

Two more recent government documents on the relationships between science and society in terms of public engagement have been the consultation document *A Vision for Science and Society* in 2008 and the *Science for All* report in early 2010 (DIUS 2008; BIS 2010). In the first of these reports, the introduction from the then Minister of State for Science and Innovation, Ian Pearson, suggests that

“[s]cience and Society” used to be an area which was seen solely as a niche part of science communication. Today, we have no choice but to see it as a necessary condition for British—and global—success. (DIUS 2008: 4)

In keeping with the themes of dialogue and engagement put forward in the 2000 Report, *A Vision for Science and Society* recommends developing public engagement with science, highlighting the role for public consultation on science policy. However, emphasis is also placed on the importance of science innovation for the economy, the need to develop a scientific workforce and to improve the understanding of science across the population, rehearsing thereby the Bodmer Report and the series of scientific literacy arguments made during the Cold War period (Lehr 2007). This mixture of democratic, economic and educational arguments is taken up in *Science for All*, which followed the 2008 consultation. Although commissioned by DIUS, it was written by a non-governmental expert group comprising a number of PEST researchers and practitioners (BIS 2010). Unlike its predecessors, *Science for All* recognizes the multiplicity at play in the still emerging field of PEST, noting the many different actors, motivations, outcomes and publics involved and the potential for confusion in such a diverse setting. Instead of presenting a series of arguments for the value of science, and as a result of PEST, *Science for All* focuses on describing contemporary PEST concepts and practices, albeit with one telling acknowledgement in the introduction:

In the current economic climate it is undoubtedly the case that the sciences and scientists need to demonstrate their case for continued public investment to Government and the wider public on economic and social groups as well as through their contribution to the growth of scientific knowledge itself. (BIS 2010: 6)

Thus, through the various iterations of PEST concepts and purposes manifest in Government documents, increasing public dialogue around the governance of science is related at times to education, but repeatedly to the implicit value of democratic participation in science, and to increasing public confidence in science and thereby public support for science.

The take-up of PEST ideas was also mirrored outside government by policy reports from learned societies. Scientific societies such as the Royal Society and the British Science Association (formerly the British Association for the Advancement of Science—BAAS) positioned PEST as an important part of democratically sound scientific practice and as a key tool for ensuring the mutual engagement of publics, scientists and policymakers (BA 2002; Royal Society 2004). The Royal Society report *Science and the Public Interest*, building on the idea of PEST as key to the governance of science and in particular the funding of science, argued that privately funded as well as publicly funded scientific research ought to consider public interests and communication (Royal Society 2006). Despite the accordance of part of *Science and the Public Interest* with public participation in science, the Royal Society can also be seen as playing a part in

what Fjaestad has described as the science lobby (Fjaestad 2007). The Report concludes that communicating with the public should become a key part of scientific training, but positions this as a critical device with which to forestall the creation of a regulatory body for the communication of scientific research, thus attempting to protect the autonomy of the scientific community in terms of engaging with publics (Royal Society 2006). The interplay of multiple actors, of which the government and scientific societies are but two stakeholders in a field of many more, is indicative of the overlapping and at times contradictory motivations pushing and pulling the development of PEST in the UK policy context.

In addition to policy documents, further evidence for the sometimes problematic nature of PEST can be seen in the emergence of government dialogue practices. In order to pursue its public engagement objectives, the New Labour Government instituted a series of initiatives, notably the Sciencewise Expert Centre for Public Dialogue in Science and Innovation, funded by the Department of Business, Innovation and Skills and the national Beacons for Public Engagement. The first seeks to have public dialogue events inform government policy whilst the second aims to engage publics with research carried out in Higher Education Institutions.³ These initiatives are notable for their size and scale, involving considerable budgets and multiple institutions, and attempting to deliver PEST with measurable impacts on both policy and publics (RCUK 2008). Research suggests that, in attempting to deliver the dialogue, discussion and debate emphasized in Science and Society, projects such as Sciencewise, perhaps predictably, tend to reinforce the boundaries between different “publics”, rather than engage these publics with science and science policy (Burchill 2007). And while little research about the impact of the Beacons exists as of yet, similar questions might be posed about the extent to which PEST practices, beneath the surface of declared intentions and visions, have surpassed PUS premises in a significant and substantive way. The proliferation of PEST activities outside those initiated and sponsored by the New Labour Government demonstrates how salient the language and concepts of PEST have become (Mesure 2007). Despite the considerable increase in forms of public engagement, the extent to which the scientists and policymakers involved in such events have developed conceptualizations of science and society relationships beyond those found in the PUS model is questionable (Burchill et al. 2009; Holliman et al. 2009). Additionally, while government support for some PEST initiatives is quite evident, a controversial report commissioned in 2007 to assess the effectiveness of governmental support for public engagement activities in UK science centres concluded there was insufficient evidence of the impact of science

³ More information on Sciencewise can be found on: <http://www.sciencewise-erc.org.uk/cms/>; and on Beacons for Public Engagement: <http://www.publicengagement.ac.uk/>.

centres to warrant public funding for such institutions (Frontier Economics 2009). Therefore, the landscape of PEST is still confusing at the present time, with the attitudes, policies and practices of the various players presenting a somewhat confusing mixture of motivations, justifications and objectives for their decisions and actions.

Discussion

Since the mid-1980s the gulf between the scientific establishment and the public of public opinion has come under governmental policy jurisdiction; it came to be viewed as something to be steered and regulated, rather than left to the unpredictable variables linked to discordant interested visions associated with scientists, science organizations, the media and pressure groups. Within the EU and the UK, there have been a number of largely STS-informed policy initiatives designed to encourage the emergence of new engagement-oriented science contexts, forums and events, in addition to some initiatives coming from individuals and civil-society organizations. The aim has been to induce grounded modes of mediation between public and science that can offset the communicative deficit of “received” science and its scientism, as well as depart from Bodmer-type deficit-model approaches organized around restrictive assumptions about the public and the nature of science. This has ushered in what we here describe as the deliberative turn in modes of public-science mediation.

The breadth of PEST practices includes a wide—and widening—range of activities and events. They include: public debates of varying scale, frequency and focus [the most famous of which in the UK is the GM Nation (Rowe et al. 2005)]; citizens’ juries or citizens’ conventions [happening at national and even cross-national levels, such as The Meeting of Minds (Goldschmidt and Renn 2006)]; science shops and café’s scientifiques; science festivals (the major ones in the UK being organized in Manchester, Cheltenham, Glasgow, Oxford, Brighton, Bristol and the UK-wide festival organized by the British Science Associations); forums around outreach programmes organized by universities and laboratories in local schools and community centres; in addition to small-scale forums—often known as dialogue events—that take place within science museums and science centres (Pedretti 2004, 2007; Tlili et al. 2006; Bandelli et al. 2009). This presents us with a challenging spread of activities, modes of operating and delivery, and even divergent objectives. Not all activities can be said to be aimed to relay and enact deliberative democracy, even in the minimal formal sense of the term. In many PEST activities, the deliberative-democratic aspect or objective can get upstaged by other objectives: i.e., exclusively focusing on delivering information, entertainment and/or the building of social capital within and across local communities. Indeed, the events and activities that go by the name of PEST are distributed along a continuum of contrasting motivations, ranging from PUS-

oriented goals to those associated with deliberative democracy where dialogue is an end in and of itself (Trench 2008). The fluid and heterogeneous make-up of the PEST field, and the attendant difficulty to map and theorize it, are what Hagendijk and Irwin (2006) clearly show through a pan-European study of the deliberative mode of science governance. The concept of PEST seems to be constantly under construction and reconstruction. One explanation for the absence of a well-bounded operational remit for PEST is that it is still in its early stages, still trying to carve out a distinct organizational identity, or at least distinctive functional and operational remit and set of parameters. However, there is a sense in which this blurry and inchoate shape could be valued as a positive sign of PEST's accommodating capacity that can enable it to respond to the multiple expectations and objectives that follow from its unique position at the crossroads of several organizational fields—mainly informal science education, the democratic process and entertainment. This indeterminacy can also enable PEST to serve as an open-ended space for creative experimentation with democracy.

In fact, the extent to which a PEST activity can be said to partake of and feed into the deliberative democracy ethos depends, in the first instance, on how we conceive of deliberative democracy as a generic category, and how we conceive of deliberative democracy specifically in PEST. There can be multiple conceptions of what constitutes the sine qua non of an event that deserves or warrants the deliberative democracy classification. A number of differentiating criteria can be identified that can yield distinct conceptual configurations of what deliberative democracy can refer to: these include whether or not deliberation has a substantial impact on policymaking; whether the composition of the participants involves only so-called "lay" citizens or "lay" and "expert" participants; and whether numbers should matter in classifying an event as sufficiently "public". These are not self-evident criteria or measures; there remains the sticky question of how to construct criteria for these criteria, which entails a number of tributary questions such as: How substantial should "substantial" be when we talk about impact on policy/action? Who is the expert and who is the "lay" citizen, and what makes them so classified, and is the classification to reflect a difference in degree or in kind? The reification of the categories—in both senses of category—of "lay citizens" vs. "experts" is defeated in advance, simply because expertise is of necessity situated: it is best seen as a function of the problem or question at hand, especially given the high degree of differentiation of scientific knowledge. Stengers captures this contingent situatedness of expertise when she notes: "Of course, the 'public' can't intervene [as experts] in the question of whether the Big Bang is a fiction or a reality. But no more can non-specialist physicists" (2000: 50). Another no less tricky conundrum pertains to the question of how representative these events are of the "public". For a deliberative-democratic PEST is bound to be haunted, both in practice and in theory, by the fact that, when all is said and done, those who take part in reasoned public deliberation, apart

from everything else, will always be self-selected. These questions and concerns are bound to throw up some intractable empirical multiplicities in imagining the public (Collins and Evans 2002; Kerr et al. 2007).

The next set of questions concern pedagogy (in the broad sense of pedagogy): how to “recontextualize”—in Bernstein’s sense (2000)—science for deliberative democracy; how to build deliberative-democratic affordances around science; and what type of pedagogic philosophy should organize PEST enactments? In both the EU and the UK, attempts are being made to move public engagement with science beyond an after-the-event information-transmission model and onto a deliberative-democratic terrain. Soon after *Science and Society 2000* was published, Miller (2001) highlighted the risk PEST practices would run in distancing themselves from the deficit model in an unqualified way: PEST practices might move too far from the knowledge base required to discuss scientific issues with an appropriate level of information, resulting in a sense of scientific expertise as taboo. It is important to note that science communication per se can be sidelined due to some overreaction against the information-transmission dimension whereby any flow of information from scientists to non-scientists, built around the inevitable opposition of knowledge/non-knowledge, tends to be dismissed as part of the passé deficit-based model, and in some sense as “politically incorrect”. This has become in a sense an unreflexive *de rigueur* gesture: any activity that presupposes lack of knowledge or possible misconceptions on the part of the public, and thus aims to question or correct them or be in any way didactic, is to be avoided as a matter of course at any cost. The situation, we argue, is more complicated than the simple and neat opposition between a didactic deficit model and an empowering and benign engagement model. Rather than rush to brand and dismiss aspects of information-transmission as elitist and undemocratic, we need to start from the recognition that scientific knowledge is differentially and unequally distributed; this unequal distribution has nothing to do whatsoever with mental assets or deficits of those who know and those who do not know or know less (Norris 1998).

Ironically, the unqualified criticism of the transmission-model as necessarily bound up with a deficit-model outlook requires and depends upon an asocial image of knowledge production and acquisition. Continuing to refuse to recognize the unequal distribution of scientific knowledge by purging PEST of all traces of information-transmission will not of itself rectify the situation. Its only impact is an unhelpful censorship effect whereby we cease to talk about the unequal distribution of knowledge, without there being any change for the better as far as this inequality is concerned. Meanwhile, research on the relationships between experts and publics in PEST contexts has continued to explore the contextual, emergent and the continued privileged status of expert knowledge in PEST practices in ways that support elements of both the contextual and participatory

PEST model and what is known as the deficit model (Collins and Evans 2002; Jasanoff 2003; Kerr et al. 2007). Thus, despite the overcompensation in some areas of PEST to distinguish engagement models from deficit models, the deficit model nonetheless often resurfaces as a significant element of how contemporary PEST is conceptualized and enacted, as recognized in the more nuanced PEST models mapped more recently (Trench 2008). A sense of unease with the total rejection of the deficit model was echoed repeatedly by a number of STS scholars who, while not rejecting the more participatory and contextual elements of the shift from PUS to PEST, have raised concerns about the need for information in personal and political decision-making processes, the role of expertise and a more complex model of how knowledge is created, distributed and used (Durodie 2003; Sturgis and Allum 2004; Wynne 2006).

The now fashionable dismissal of any hint of information-transmission is presumably made in the name of the empowerment of the public, and the democratization of the relation between science and public: with science becoming modest and dialogical and the public becoming empowered, respected and heard. This is underpinned by the good intention of breaking with the negative assumptions about the public attributed to information-transmission models arrangements and objectives—assumptions derived from the knowledge/ignorance opposition. But what we need to recognize is that images of the public underpinning the putatively democratic, non-didactic philosophy rest on no less problematic assumptions about the public. If anything, they are more problematic in their most likely effects. This putatively democratic and empowering paradigm indeed contains many seeds of its own de(con)struction. Hostility towards the information-transmission model in the current paradigm of PEST is, at root and despite all appearances to the contrary, built around a crude opposition between experts and the public that, ironically, reinscribes a patronizing and devaluative view of the public. Unconditional dismissiveness of the transmission model reproduces the Platonic division of episteme and doxa. It works in such a way as to confine the “public” to a doxa-based and doxa-oriented role insofar as they are invited to voice their reactions and opinions without having to know or come to know anything about science, or anything they do not already know. This can happen via three possible ways of imagining the public which often come in mixed forms:

- (a) The public are assumed to know enough already and to be in no need of acquiring new knowledge;
- . (b) They are not interested in knowing; they fare well with the everyday knowledge they already have by virtue of living in society as citizens (with citizenship understood in an essentialist and ahistorical sense of “ascriptive citizenship” (Smith 1997), citizenship as status tied to territory, and thus is

in no need of a vibrant democratic process to cultivate it and facilitate its responsive situated enactments);

- . (c) They should not be made to know, as this coming-to-knowing involves (a) knowing about one's lack of knowledge in the first instance, which will be offensive; and (b) will set up science as a superior form of knowledge, and communicating science will amount necessarily to a didactic pedagogy that oppresses and devalues their vernacular knowledges.

Whichever image(s) of the imagined public to be adopted, the fact remains that this take on the public boils down to a position that in effect perpetuates the status quo with regard to the distribution of knowledge insofar as it reinforces people's exclusion from something they have already been excluded from. Further, it underestimates, even takes out of the equation altogether, "lay" people's inquisitive drives as well as their concern about their own *Bildung* through interesting mediations of scientific knowledge. The ironic thing is that, based on a relativist STS-inspired outlook, the "lay" members of the public will not be missing out on anything really worth learning on the ground that science is itself only yet another ideology-laden worldview and form of knowledge as valid as any other, including their own vernacular forms of knowledge and opinions (the only difference being that scientific knowledge is powerful enough to have itself recognized and institutionalized as superior). A model of engagement purged of informal learning of science in the name of empowerment and democracy, it should be remembered, has not been established in a very democratic way. Nor is it democratic in terms of the way it affects "lay" people: they are presented with the forced choice of confining themselves to expressing their opinions and resting content with their *doxa*, without having to bother about anything else, especially not scientific knowledge and the complexities that arise from its applications.

But this self-complacent position is good for neither democracy nor equality, nor indeed the pursuit of scientific knowledge. It is all too easy, and self-congratulatory too, to ride "the spirit of the times", moralize about democracy and science, but leave the unequal distribution of scientific knowledge unthought and thus taken for granted. So, the first task is simply to depart from this self-contradictory version of democratic egalitarianism brought to bear on public-science mediation as a potential worksite of democracy. At a conceptual level, we need to proceed by postulating two axioms: inequality with regard to the distribution of knowledge; equality with regard to the ability as well as will to learn, reason and know. It is in Rancière's work that we find the most forceful argument for the necessity of postulating equality as a point of departure, and the political, pragmatic but also empirical value of this organizing postulation. Equality, he argues, is "not an end to attain, but [ought to be] a point of departure, a supposition [original emphasis] to maintain in every circumstance based on the

fact that the same intelligence is at work in all the productions of the human mind” (Rancière 1991: 18), hence his related idea of “the equality of intelligence”. Rancière here is taking issue with Bourdieu’s and others’ sociological reproduction theories of education and culture. The point is that by taking inequality—rather than equality—as a presupposition to work from analytically and empirically, reproduction theories, he argues, have ended up reproducing the classifications that function in a prescriptive way and treat people as unwitting bearers of superior or inferior group mental and dispositional attributes predicated of their social positions. That all humans are equal with regard to ability and will to learn, reason and know is by no means to say that all opinions and understandings are of equal value because they emanate from the same pool of intelligence—equally distributed and non-discriminating. To collapse the egalitarian axiom of the equality of intelligences into an equality of all perspectives as culturally or subjectively contingent opinions would be a facile recipe for complacent and unreflexive feel-good egalitarianism, but with serious political and epistemological consequences. The fundamental flaw of the current orthodoxy—reflected to a great extent in mainstream theory, practice and policy—that categorically condemns any attempt to transmit knowledge is that it collapses the two distinct axioms into some unhelpful self-defensive doctrine, assuming an imaginary equality of knowledge per se. Working from these two postulates—equality of intelligence; inequality of knowledge—will make it more likely to produce experimental and creative modes of PEST that are at once educational, informative, democratized and democratizing—democratizing with regard to both science policy and the modus operandi of the public sphere more broadly.

On the other hand, more care should go into thinking the complex relations between science and democracy, in fact between various possible versions of science and various formats of democracy. Relationships between science and democracy have been a subject of interest for those re-imagining a more democratic science, from a philosophical rather than public engagement perspective (Kitcher 2001; Longino 1990). The relations are not as straightforward and as happy as they are often assumed to be—ones of complementarity and mutual predication—and if they clash, then the clash is explained simply through either scientists’ non-democratic peer-oriented ways and/or the deficit of organizational arrangements for upstream democratization of science. In other words, inevitable hitches are constantly explained by the lack of fit between principle and reality, not by unpacking and scrutinizing the principle itself and its limits and internal tensions. This, at base, follows from collapsing different “value-spheres” into an undifferentiated bloc of values, all the while taking no account of the epistemic values of science that are always in excess of the values of scientists, even the most successful and ingenuous amongst them. Which points to another problem in some simplistic STS-inspired approaches to engagement: a

humanist reduction of science to the subjectivities of scientists who are presented in too modernist a light to square with the professed postmodernist credentials of the recent waves of STS (its crude modernism consisting of the ultimate reference of all that occurs in science to a grounding cynical subject). Scientists are framed as self-conscious and constituent subjects whose conscious, self-interested agency is all that matters to understand how science is produced and the truth-value of science per se. This is rooted in an unacknowledged transposition of the modernist subject in its classical-liberal version.

What seems to be least helpful for a constructive and challenging PEST is this constant axiological adequation between democracy (as self-governance), justice (as the name for equality of citizens' access to scientific resources and recognition of their ability to contribute to the conduct of science) and science (as propositional knowledge with present-best truth-values, or at least present-best "truth-tracking" values (Norris 2005)). In essence, this view has little purchase on the intrinsic discordances between knowledge, democracy and social justice, their respective norms, enactments and uses which, whilst they might overlap empirically in some cases, remain irreducibly heterogeneous to each other. Badiou very nicely captures this tension when he says: "It's certainly true that voting has little to do with truth. If our knowledge of planetary motion relied solely on suffrage as its protocol of legitimation, we would still inhabit a geocentric universe" (2006: 15). By the same token, it was hardly through some popular vote or democratic consensus that evolutionary theory has established its truth credentials and its foundational role for subsequent developments in various branches of biology, medicine and genetics. In other words, and paradoxically, the democratic means is inadequate to the task of adjudicating over the goodness of opinions with regard to their truth-value (or truth-tracking value for that matter). In a sense, developing scientific knowledge proceeds through what can be described as undemocratic eruptions, torsions, displacements and negations—what Badiou would describe as acts of "creative violence" that stand beyond the moralizing and indeed irrelevant dichotomy of good and evil.

Strategies have been developed, theorized, enacted and revised for assisting with the development of a more participatory science (Jasanoff 2003; Wilsdon and Willis 2004; Rowe et al. 2005; Felt and Fochler 2008). Despite the many attempts to reconcile various visions of science, participatory democracy and public engagement, what does not seem to be sufficiently recognized is that science and democracy belong in two competing value-spheres whose relation is, at best, one of mutual indifference, and at worst, one of outright conflict that can throw up some tricky dilemmas. We hardly need to reiterate one or two of the many classic examples of this conflict (Collins and Evans 2002), reminiscent in many ways of Kant's antinomies of reason—in our case democratic reason pitted against scientific reason. What are we to do if, in the name of democracy in its established

majoritarian form (whose legitimacy is rooted in popular suffrage and sovereignty), we were to oppose the pursuit of a given research programme based on their democratically negotiated but non-scientific or science-irrelevant considerations? Perhaps this tension between the nature of knowledge and democratic participation can explain to a certain extent the resistance of the deficit model and its continued presence in the wide spectrum of contemporary PEST concepts and practices noted by several researchers (Trench 2008; Burchill et al. 2009).

The aporias and complex implications—practical and conceptual—that arise from the marriage of democracy and science have received little attention in policies and theories of deliberation in science governance (Nelkin 1977; Jasanoff 2005; Nowotny et al. 2001, 2003; Jasanoff 2003; Lengwiler 2008; Stirling 2008). In parallel, it is not very helpful to posit democracy as a normed ideal that is pre-established in its final shape, against which PEST activities can be judged and measured. Democracy should be seen as a creative practice, always in excess of its a priori normative determinations. The role of the democratic space in relation to science should be approached as at once an educational opportunity without a predetermined educational outcome, an interruption of science by non-scientific means on the ground of the sociality of the effects of science—as opposed to its conduct—and as “a partition of the sensible”, in Rancière’s sense, i.e., a disruption of the consensual model of democracy as expression of that which is given in one’s social identity/location coordinates. The challenge with regard to science is not less science and more culture as some fashionable STS-inspired views seem to suggest; it is more science in spite of and precisely because of the encroachment of the cultural into the scientific.

Given the degree of incommensurability and, in a sense, mutual indifference between democracy and science, essentially between the organizing axioms immanent to each, it is all the more important to see the coupling of democracy and science as an artifice that needs to be creatively thought out and designed. Democracy as creative experimental praxis does not have to, and arguably should not, be oriented towards consensus, as Habermas’s normative expectation goes, and as is the general drift of current engagement events (Irwin 2006), because dissensus can have even more value in cultivating a sense of civic engagement and freeing democracy from the existing consensual model of opinion management (Rancière 2004, 2010). In any case, consensus is a very rare currency even among scientists, and arguably is neither empirically feasible nor even desirable; and should not in any case be taken as the end-goal of PEST; consensus and consensus management are of the order of what Negri (2009) calls “constituted power”; dissensus is what can feed into “constituent power”. The ability to think for oneself, and to think otherwise about science and science-related issues within the void created by macro majoritarian politics, is far more worthwhile. Disrupting the

established doxa is in itself a very worthwhile goal; and that applies as much to scientists' opinions— which should be analytically distinguishable from their science—as to the non- scientists' opinions. We would do well to see and approach deliberative democracy in PEST as a creative struggle against the weight of spontaneous, self-interested and pre-given doxa of scientists and non-scientists alike.

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