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Diversifying the Deliberative Turn: Toward an Agonistic RRI

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Abstract

In its "deliberative turn," the field of Science & Technology Studies (STS) has strongly advocated opening up decision-making processes around science and technology to more perspectives and knowledges. While the theory of democracy underpinning this is rarely explicitly addressed, the language and ideas used are often drawn from deliberative democracy. Using the case of synthetic biology and Responsible Research and Innovation (RRI), this paper looks at challenges of public engagement and finds parallels in longstanding critiques of deliberative democracy. The paper suggests that STS scholars explore other theories of decision-making and explores what an RRI grounded in agonistic pluralism might entail. An agonistic RRI could develop empirical research around questions of power relations in contemporary science and technology, seek to facilitate the formation of political publics around relevant issues, and frame different actors' stances as adversarial positions on a political field rather than "equally valid" perspectives.

Introduction

Science and Technology Studies (STS) has gone through a "deliberative turn" in recent years (Carrozza 2015, 108; Lövbrand, Pielke, and Beck 2015, 477). STS scholars have strongly advocated opening up decision-making processes around science and technology to more perspectives and knowledges. These same scholars, however, rarely explicitly state what theory of democracy underpins this drive to democratize science. The language used tends to draw on one democratic model in particular: deliberative democracy. Yet, this is far from the only theoretical ground for justifying the expansion of expertise or challenging technocracy.

Indeed, we may find that other theories of democracy better fit the sensibilities and priorities of STS scholarship.

In this paper, I examine efforts to involve public and stakeholder participation in synthetic biology, most recently under the label of Responsible Research and Innovation (RRI[1]), in order to consider the impacts of its underlying political theory. I researched the governance of synthetic biology from 2010 to 2020, and in that time played a variety of roles, including: a participant observer of negotiations at the UN Convention on Biological Diversity (CBD) and the Biological and Toxin Weapons Convention; a consultant to the CBD; an instructor on a "social dimensions" of synthetic biology course for biotechnology Masters students; a co-organizer of workshops that included synthetic biologists; and a coauthor of an RRI framework for a multi-funder program on synthetic biology, systems biology, and industrial biotechnology.[2] This paper arises from my engagement with processes attempting to bring democratic principles to the practices and governance of scientific research and innovation. Sometimes I was a critical outsider; sometimes I was a frustrated insider. Again and again, the ideal of a broadly informed and inclusive decision-making process was not met. Over time, I started to wonder whether the ideal itself was part of the problem.

Despite rarely being explicitly discussed in STS literature, deliberative democracy has been at the heart of much STS work around public participation and engagement. It has been an important touchstone in the theorization and institutionalization of RRI, and thus played a role in shaping the growth of synthetic biology as a field. And yet, there is arguably an uncomfortable fit between deliberative democracy and STS. In this paper, I look to

[1] In this paper, I use RRI to also refer to Responsible Innovation, a parallel term.

[2] See https://bbsrc.ukri.org/documents/eracobiotech-rri-framework-pdf/ for this RRI framework, developed by Robert Smith, myself, Zara Thokozani Kamwendo, and Jane Calvert. Accessed Sept. 22, 2021.

experiences with RRI in synthetic biology, drawing parallels between challenges in this area and common criticisms of deliberative democracy. The good news is that neither STS nor RRI are restricted to this one model of democratic decision-making. I explore the possibilities of an RRI based on agonistic pluralism and how this theoretical approach could lead to shifts in how RRI is structured, who is invited to take part, and its goals.

Deliberative Democracy: Rational Consensus for the Common Good

The term *deliberative democracy* was first used in 1980, and by the end of the 1990s it was established as "one of the most fashionable ideals in contemporary Western political theory" (Besson and Martí 2006, xiii). It was developed in response to the aggregative model of democracy, in which citizens participate in democratic decisions primarily through voting for representatives in competitions between individually-held preferences (Benhabib 1992; Habermas 1984). This aggregative model was criticized for taking preferences as given, lacking an idea of a public, and restricting itself to a "thin and individualistic form of rationality" (Young 2000, 20). Deliberative democracy was meant to be an alternative model in which political decisions gained legitimacy through free and unconstrained deliberation among those potentially impacted.

Broad as this approach may sound, deliberative democracy involves quite specific conditions for deliberation. At the core is Jürgen Habermas' theory of communicative action, in which parties seek mutual understanding and are open to reflecting on their own interests, rather than strategically calculating what best serves their individual interests (Habermas 1984; Dryzek 2006). Habermas argued that deliberation can be both rational and legitimate if it meets "ideal speech" conditions: debate open to all who may be affected; outcomes sought through the force of argument rather than coercion or threat; and participants open to

changing their minds as a result of reflection (Habermas 1984; Kapoor 2007). Arguments must be made on the basis of reasons "reasonably acceptable" to all involved and aimed toward "the common good." These conditions are meant to "bracket the influence of power differentials" (Young 2001, 672). This is about reciprocal and public collective reasoning, transcending "mere agreement" to provide a "rational consensus" (Kapoor 2007; Habermas 1984).

Deliberative democracy has developed significantly; the framework described above is its first generation, while scholars are currently debating a fourth (Elstub, Ercan and Mendonca 2016).[3] Yet it is this first generation's basic premise that underlies much STS theory and practice.

STS and the Lack of Deliberation over Democratic Theory

Just as deliberative democracy arose in response to aggregative democracy, strands of STS developed to counter the technocratic model of decision-making on science and technology. The technocratic model treats science as objective (i.e., free of political taint) and universally applicable. Science is looked to as an external authority that can unify disparate interests, particularly at the global level. Decisions gain legitimacy by being based on objective knowledge of a stable nature; technical and scientific experts are thus positioned to make the best decisions (Jasanoff 2011; Peel 2010; van der Sluijs, van Est and Riphagen 2010).

Much social science scholarship argues against these assumptions of nature, science, and decision-making. Nature is not a stable external reality; it is constructed in mediated relations

[3] The second generation of deliberative democracy sought to problematize consensus and open up deliberation to a plurality of forms of rationality and communication. The third generation focused on institutionalizing deliberative mechanisms, and the fourth generation is currently seeking to scale up deliberative democracy to a systems approach (see Elstub, Ercan and Mendonca 2016).

between material and societal processes. Science is not a "view from nowhere"; it is always a situated form of knowledge and an active achievement involving an extensive network of actors/actants. Relying on technical expertise alone will likely fail to acknowledge broader socio-material contexts, and denial of such "overflows" inevitably causes problems (Braun and Whatmore 2010; Escobar 1999; Haraway 1988; Latour and Woolgar 1979; Wynne 2003).

These arguments fundamentally undermine the foundational claims of the technocratic model, but the question remains: on what basis *can* decision-making around science and technology claim legitimacy, if not via expert knowledge of objective, universal science? In general, the answer from STS has been more, and more broadly inclusive, deliberation.

As noted in the previous section, calling for deliberation is not necessarily an invocation of deliberative democracy. Indeed, it has become a regular lament that much STS theory rarely bothers to clarify what it means by politics or democracy, or indeed what political philosophy (if any) it draws from (Durant 2011; Braun and Whatmore 2010; Brown 2015). But while it is not always explicitly acknowledged, calls in STS literature for more inclusive participatory processes are often grounded in deliberative democracy (Durant 2011; Lövbrand, Pielke, and Beck 2011; Van Bouwel and Van Oudheusden 2017). For example, in the classic debate on the scope of public involvement in decision-making, Durant (2011) sees both sides as lacking clarity on their democratic theory. He interprets Harry Collins and Robert Evans's third wave (2002) as based in Rawls' ideal of public reason, while he sees the arguments of Sheila Jasnoff (2003) and Brian Wynne (2003) for greater public discussion as aligning with Habermas' vision of ideal speech. Similarly, Lövbrand, Pielke, and Beck (2011) point to *Taking European Knowledge Society Seriously* (Felt and Wynne 2007), a touchstone report

applying STS principles to science governance, as using deliberative democracy to argue that democratic legitimacy will flow from free and unconstrained deliberation.

Two significant problems generated by this reliance on deliberative democracy have already been identified. First, STS scholarship has continually resisted the actual principles of deliberative democracy. Durant (2011) argues that Jasanoff and Wynne are not "Habermasian enough"; they want democratic legitimacy to flow from deliberation but are reluctant to let go of difference and trust that the conditions of ideal speech will bracket power imbalances. This leads to the second problem: the principles of deliberative democracy are an uncomfortable fit with the sensibilities of STS. Lövbrand, Pielke, and Beck carefully walk through the 2007 Felt and Wynne report to note where the procedural principles of reciprocity and publicity, accountability, and reason "resonate poorly" with STS (Lövbrand, Pielke, and Beck 2011, 476). They note a "fundamental dividing line" between deliberative democracy's appeal to the universal validity of public reason and STS's the deep "mistrust" in universal solutions (ibid., 485).

These problems would seem to leave the STS community with a clear choice: either commit to and more closely align with deliberative democracy's procedural approach or find an alternative model of democracy that better fits a politics of difference. Instead, we continue to vaguely point to deliberative democracy for why and how to democratize science and technology, as can be seen in the case of synthetic biology.

Synthetic Biology, RRI, and Their Discontents

The field of synthetic biology formed in the early 2000s, based in part on the conceit of taking seriously the engineering aspect of "genetic engineering" (Endy 2005). Its founders

highlighted synthetic biology's potential to "democratize biotechnology" with lowered barriers to entry, a more distributed form of innovation, and greater transparency in its governance with more public engagement (Frow 2015). These visions were met with contending narratives of potential dangers: that if long-promised cellulosic biofuel actually became viable, it would require unsustainable amounts of biomass; that current regulations for GMOs would be inadequate for organisms engineered to spread upon release, as gene drives are intended to do; that the promised laboratory production of natural compounds such as vanillin would lead to the loss of small-scale producers' livelihoods (for more examples of promises and perils, see Forum 2015 and SCBD 2015[4]).

At the same time that synthetic biology was coalescing as a field, the European Commission (EC) was seeking to counter perceptions that it suffered a democratic deficit. One of its responses was to place greater focus on public participation exercises. From around 2000, deliberative democracy was identified as a strong theoretical basis for this long-standing tool of the EC (Voß and Amelung 2016).

In this context, deliberative democracy became the most significant framework for public engagement around synthetic biology. Amy Gutmann, noted scholar of deliberative democracy, chaired the US Presidential Commission for the Study of Bioethical Issues when it produced its influential report on the ethics of synthetic biology and emerging technologies (PCSBI 2010). The report's recommendations are based on democratic deliberation, justice, and fairness. It advocates approaching potentially divisive issues of emerging technosciences through civil discourse among a diverse group of stakeholders willing to place a "societal

[4] I was a lead author on this CBD Secretariat report.

perspective over individual interests" (ibid., 5)—i.e., to set aside their individual interests in favor of the common good.

Across the ocean, the EC was developing a version of Responsible Research and Innovation (RRI) on similar grounds. EC officer Rene von Schomberg was instrumental in developing and institutionalizing what became the most popular version of RRI[5]:

> Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view to the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society). (von Schomberg 2013, 19)

Von Schomberg explicitly identifies deliberative democracy as the way to build more "responsive, adaptive and integrated management of the innovation process" (Ibid., 21). His ideal process involves societal actors coming to the table willing to "resolve conflict and go beyond their traditional roles: companies addressing the benefits and NGOs the risks" (Ibid., 28). Such ongoing public debate will provide legitimacy to policymakers' choices in agenda setting and research funding. Greater reflexivity in research practices will lead to "well accepted technological advances" (Ibid, 27).

In the UK, a slightly different version of RRI was developed by Richard Owen, Phil Macnaghten, and Jack Stilgoe. Arguably more interested in politicizing decision-making and

[5] Ribeiro, Smith, and Millar (2017) identify the von Schomberg definition of RRI as the most popular, based on an extensive search of scientific publications.

less interested in public acceptability, this RRI envisions coupling anticipation, reflexivity, and inclusive deliberation to responsive policy and decision-making processes (Owen, Macnaghten and Stilgoe 2012). It proposes a move away from governance by market choice and risk-based regulation, toward future-oriented dimensions of responsibility. The method to achieve this is, once again, deliberative democracy. They call for "inclusive reflection and deliberative democracy" to open up democratic processes and foster deliberation on uncertainties and potential unintended consequences (Ibid., 755).

In a few short years, RRI was broadly institutionalized across Europe, from the "Science with and for society" program of Horizon 2020[6] to the EPSRC Framework for Responsible Innovation.[7] Today, public funding for European synthetic biology research very often comes with the requirement of an RRI component. Through RRI funding, natural scientists have engaged with social scientists, shifted their perceptions of publics, become responsive to gender dynamics and inequalities, and explored open access models of publication.[8] Macnaghten (2016) credits RRI projects for leading to reconfigured academic and policy understandings in geoengineering and nanotechnology. But there is also a growing body of criticisms and laments of RRI, often framed as a failure to properly undertake deliberation (de Saille 2015; Hartley, Pearce, and Taylor 2017; Owen 2016; van Oudheusden 2014).

In the next section, I question the assumption that the best way to fix RRI is by better implementing deliberative democracy. Attempts to bring publics and deliberative processes

[6] Accessed Sept. 22, 2021. https://ec.europa.eu/programmes/horizon2020/en/h2020-section/science-and-society.
[7] Accessed Sept. 22, 2021. https://epsrc.ukri.org/research/framework/.
[8] Democratic engagement is only one part of RRI. The EC's version of RRI includes five "keys": gender in research, open access, science education, ethics, and public engagement (EC 2019). As RRI is actually implemented across research projects and innovation processes, this last key is often neglected (Hartley, Pearce, and Taylor 2017). It is far easier to engage with publics by developing science communication around a research project than it is to provide space for dissenting visions of that project's goals.

into synthetic biology align with common criticisms of first-generation deliberative democracy.

Synthetic Biology and the Challenges of Deliberation

At least three areas of difficulty in synthetic biology's attempts to involve publics have strong resonances with the challenges of first-generation deliberative democracy. I describe these as the lure of consensus, the pitfall of the personal, and the danger of legitimation.

The Lure of Consensus

While later generations of deliberative democracy have worked to problematize consensus and make space for contestatory deliberation (Elstub, Ercan and Mendonca 2016), Habermas considered consensus an inevitable outcome of providing the conditions for ideal speech (Habermas 1984 in Bond 2011). The strong legacy of Habermas's rational consensus is visible in key works on public engagement and RRI around synthetic biology. Frequently, dissent is framed as a problem to be solved. Von Schomberg points to the history of genetically modified crops in Europe in the mid-1990s, claiming it "shows how substantial dissent among major stakeholders frustrates responsible development" (2013, 15). Overall, stakeholder dialogue within RRI is dominated by an ideal of alignment and harmony, that win-win solutions can and will be found (Blok 2014). For example, the website for the EC-funded project RRI Tools (2014-2016), which provides almost eight hundred resources for conducting RRI, includes in a framing section: "Governance structures that promote RRI reduce unintended and unforeseen practices and impacts of research and innovation, as well as tensions, conflicts, mistrust and opposition that are more difficult to deal with downstream."[9]

[9] Accessed Sept. 23, 2021. https://rri-tools.eu/how-to-pa-governance#menu-anchor-id3-content.

Critics of first-generation deliberative democracy point to dangers in promising consensus. Setting consensus as the ultimate goal pushes deliberation in particular directions from the start; it narrows the agenda and removes difficult actors (Young 2000). As Porter (2011) notes, every consensus is based on exclusion: some voices are not included in order to get to agreement, and alternative ideas are rejected along the way. The danger in consensus-based approaches is not necessarily that these exclusions happen, but that the process obscures the "particular constellation of power that produced the decision," allowing the final decision to be considered inclusive (Porter 2011, 479; Purcell 2009). These dynamics of obscured exclusion are further exacerbated by deliberative democracy's demand that individuals offer solutions aimed toward the "common good" over self-interest. Whose perspectives are seen as legitimate is significantly impacted by who frames "the common good."

We can see some of these dynamics within explicitly "inclusive" processes connected to synthetic biology. In the UK, the Synthetic Biology Leadership Council (SBLC) was founded in response to the industry-led 2012 *Synthetic Biology Roadmap for the UK* (described further below). Self-financed, the SBLC was jointly chaired by a government minister and a representative from industry and meant to work with academia, regulators, non-governmental organizations, and other government departments.[10] The SBLC Subgroup on Governance was particularly active and visible in regulatory debates and public engagement (Clarke and Kitney 2016). While the breadth of expertise in this group was notable, it obviously lacked representation from critical civil society organizations (Porth et al. 2017). While synthetic biology in the UK has hardly provoked the societal backlash of GMOs in the 1990s, there are

[10] Accessed Sept. 23, 2021. https://www.gov.uk/government/groups/synthetic-biology-leadership-council. The SBLC has been renamed the Engineering Biology Leadership Council. There is no longer a Subgroup on Governance.

numerous international and British groups who have persistently challenged the funding, goals, and governmental oversight of genetic engineering. Not one representative of these groups was invited into the SBLC or its Governance subgroup. Membership was "restricted with regard to the manageability and efficiency of the governance process" (Ibid., 83). In other words, no one was included who would likely challenge the SBLC's goal of promoting economic growth through the development of synthetic biology.

This is not unique to the UK. Morgan Meyer describes the disruption of a French deliberative forum on synthetic biology by activists in monkey masks, repeating slogans such as "false debate, we do not participate" and holding signs reading "participating is accepting" (2015, 102 and 103). Across the landscape of RRI, we can find "acceptable arguments toward the common good" interpreted as requiring engagement within the terms of commercialized innovation. As a result, "activist" NGOs are kept out, whether because they are deemed insufficiently responsible or because they refuse to engage within such narrowly framed processes. Either way, the dominant power structure is sheltered from challenge and the process considered "inclusive."

The Pitfall of the Personal

Political theorist Chantal Mouffe (2005, 2013) accuses deliberative democracy of attempting to purge plurality from the public sphere in favor of a fully inclusive consensus on a common good, only allowing pluralism in the private sphere. Mouffe (2005) sees the belief in reasoned dialogue's power to solve conflict as part of a post-political vision of politics, in which there is no room for collective identities or ideological divisions.

From the start of synthetic biology, governments focused on a narrow range of biosecurity and biosafety concerns (RAE 2009) and sought to categorize good and bad uses of the new tools (Evans and Frow 2015). As synthetic biology has developed, more types of concerns and desires for the field have been acknowledged. Yet these are almost always framed as issues within the personal realm of individually-held moral views, rather than conflicting political visions.

An example of this is the Synthetic Biology Deliberation Aid developed by the UK BBSRC, Friends of the Earth (England, Wales and Northern Ireland), and Forum for the Future (Forum 2015). The Deliberation Aid is framed as a decision-making tool for use in planning a broad range of activities, including scientific research, commercial investments, and advocacy campaigns. It posits fourteen key questions for a potential application of synthetic biology, covering significant scope from ownership and governance to livelihoods and resource use. Recognizing that it takes resources to bring people with different viewpoints together, the Aid provides the user with six personas, such as a mother of two who avoids buying food containing GMOs and a retail board member who believes in embracing technological advancement. The Aid stresses that "all their perspectives are equally valid" (Ibid., 58).

The user of the Aid is meant to go through the fourteen questions from these different personas' vantage points. This could help a user recognize that a differing perspective on synthetic biology might be based on more than ignorance or ill will. The personas can be understood as a useful exercise in representative thinking, in learning to see as the other and thus act more responsibly (Arendt 2006).

And yet, it is not clear what the user is meant to do with these "equally valid" viewpoints. The Aid fails to acknowledge these views may involve different visions of present and future worlds, and thus conflicting political visions. An urban farmer working toward a world fed by locally-led, diverse, small-scale agriculture may have a dramatically different understanding of the potential impacts of synthetic biology than that of an industrial-scale farmer aiming to feed the world through higher yields and computer-assisted farming. It is an important start to acknowledge that both these visions are valid, but one must then recognize their incompatibilities. They disagree on who ought to exercise power and to what ends. It is unclear what the user of the Deliberation Aid is meant to do with such incommensurable conflicts.

The Danger of Legitimation

On the whole, RRI has not facilitated the politicization of decisions around research and innovation (de Saille 2015; Hartley, Pearce, and Taylor 2017; Owen 2016). Critics of this lack of politicization tend to focus on the ways that RRI has short-changed deliberation. For example, Stevienna de Saille (2015) traces how, in the wake of the financial crisis, the European Research Council's support for RRI alternated between democratic deliberation processes and an innovation-oriented approach focused on markets. Sarah Hartley, Warren Pearce, and Alasdair Taylor (2017) see the problem as a gap between "RRI in theory" and "RRI in practice": in theory, RRI can pluralize expertise and open up decision-making to a broader range of voices and values; in practice, RRI legitimates research by simply including a social scientist or a bioethicist on a grant, deeming it Responsible regardless of the actual work carried out.

I agree with these assessments of the failures of deliberation in RRI. And I believe that a fix must go beyond more deliberation, even beyond greater inclusion. Without attention to how hegemonic discourse frames debate, a deliberative process may seem to provide a neutral setting while actually silencing dissenting views (Young 2001). Demanding that arguments be made in the context of the "common good" places a heavy burden on disempowered groups to demonstrate why change is in everyone's best interest. Even broadly inclusive deliberative processes can uphold dominant power relations while bestowing legitimacy on the resulting decisions (Purcell 2009).

Such dynamics are visible in Claire Marris and Jane Calvert's (2020) analysis of their involvement as critical social scientists in the UK's "Roadmap for Synthetic Biology." Marris and Calvert were invited late in the process of developing the Roadmap. They were allowed to write substantive portions of the text, most notably a chapter on RRI that was initially intended to be on "public acceptability." They tried to use RRI to steer the group away from the underlying assumption that public distrust and misunderstanding were the main obstacles to synthetic biology's development. Despite enthusiastic support from the rest of the group for including RRI, Marris and Calvert found their textual interventions were subtly changed prior to publication, in ways that reoriented the meaning back to the initial assumptions of a linear model of innovation and a deficit-model understanding of the public. "In the end and despite our efforts, the roadmap contributed to solidifying existing framings of synthetic biology as a driver of jobs and economic growth for 'UK Plc'… and RRI was interpreted as a means to smooth this path" (Marris and Calvert 2020, 51).

The status quo was maintained; the main messages and purposes of the Roadmap were not significantly changed by Marris and Calvert's involvement. Personally, I see that as a loss for

the Roadmap, but that is not why I see this as an important cautionary tale. The lessons I take away are twofold: engaging in a process may risk bestowing legitimacy on a 'consensus' outcome; and RRI can easily morph from a counter-hegemonic challenge to support for a hegemonic narrative. Despite concerted efforts to use RRI to radically open the policy process to alternatives, RRI ultimately operated as an assurance that synthetic biology could be delivered to an accepting public. Not only did the Roadmap succeed in legitimating substantial funding from the UK government (Marris and Calvert 2020), it also became a demonstration of synthetic biology's responsibility: by *calling for* responsibility, the Roadmap *performed* responsibility. As two of the Roadmap's authors write, "social awareness" is now "embedded through the framework of RRI" thanks to the Roadmap (Clarke and Kitney 2016, 251).

Another Option: Agonistic Pluralism

I don't blame deliberative democracy for all the difficulties in implementing RRI. I see the main barriers to politicizing choices around science and technology as entrenched reliance on narrowly technocratic decision-making, belief in the necessity of market-led innovation, and the encroachment of neoliberalism on academia. Any RRI project that attempts to push against such dominant influences is bound to struggle. Nonetheless, staying within the boundaries of deliberative democracy has influenced our visions of what RRI can be; it has established boundaries on our ambitions. By exploring other theories of democratic decision-making, we can see the limits of deliberative democracy and the possibilities opened up by other theories. The rest of this paper explores agonistic pluralism and the possibilities of an agonistic RRI.

Developed in direct opposition to deliberative democracy, agonistic pluralism is a model of radical democracy developed by Belgian political theorist Chantal Mouffe (1993, 1999, 2005, 2013). Agonistic pluralism is rooted in the assertion that political questions are fundamentally about conflicting visions of power relations. The *political* is understood as "the dimension of antagonism which [is] constitutive of human societies" (Mouffe 2005, 9).[11] Mouffe sees conflict as an irreducible aspect of society, not because individuals hold competing interests (as liberal democracy understands), but because identities are formed through what Derrida calls the "constitutive outside"—the "they" that makes the "we" possible (Laclau and Mouffe 2014; Mouffe 1993; Bond 2011; Fougère and Bond 2016).

In antagonistic relationships, the Other is an enemy, antithetical to one's own existence (Mouffe 2005; Fougère and Bond 2016). Agonistic pluralism seeks to provide a system in which antagonism can be transformed into *agonism*, a relationship in which contending actors are recognized as legitimate political adversaries, not moral enemies. It is not about denying the us/them dichotomy, but rather establishing us/them differently, such that plurality is possible (Mouffe 2005). Key to this process of "domesticating hostility" is the cultivation of passionate political identities (Mouffe 1999, 754). Disagreements are played out on a political register, acknowledging conflicting visions for society; agreements are always open to contestation as power relations shift.

Agonistic pluralism is based on an understanding of power as operating through hegemony. Building on Gramsci, Mouffe and Laclau's theory of hegemony describes a complex of power relations that incarnates the particular as universal, has the consent of the majority, and

[11] 'Politics' refers to the ensemble of practices, discourses, and institutions that seek to establish a political order (Mouffe 2005).

constructs the terrain on which dispute takes place (Laclau and Mouffe 2014; Mouffe and Errejón 2016). Hegemonic orders may "sediment" into a moment's "common sense," seeming to simply describe reality, hiding the ongoing work required to keep that particular articulation of power relations in place. Still, there is always the possibility of counter-hegemonic alternatives; every hegemonic order is susceptible to disarticulation (Mouffe 2005; Mouffe and Errejón 2016).

Mouffe arguably sets up a straw-man version of deliberative democracy to serve as a foil for agonistic pluralism. John Dryzek (2006), a key theorist of deliberative democracy, insists that deliberative democracy can accommodate more contestation than Mouffe claims, that most versions of deliberative democracy reject the goal of consensus. Even so, these are two very different visions for ideal democratic decision-making. Deliberative democracy sets the stage for intersubjective understanding and agreement, while agonistic pluralism sets the stage for a struggle for hegemony (Purcell 2009). Deliberative democracy cultivates a space of public deliberation striving toward the common good, while agonistic pluralism cultivates a space of conflict seeking to make visible and ultimately transform power relations.

Arguments over the fundamental differences and potential synergies of deliberative democracy and agonistic pluralism can be read as an "allegory of the modern/postmodern condition" (Kapoor 2007, 460) and have been, unsurprisingly, fraught. These debates have played out in democratic theory (Benhabib 1992; Dryzek 2006; Habermas 1984; Mouffe 1993; Young 2001) and moved on to fields such as planning. "Expert-led" planning was challenged by planning seeking to include more citizens in the search for consensus, which has subsequently been challenged by agonistic planning that "support(s) the encounter between different conceptions of reality" (Bäcklund and Mäntysalo 2010, 343; Bond 2011;

Purcell 2009). While the field of STS is still largely committed to its deliberative turn, some scholars are starting to point out the limitations of deliberative democracy (Lövbrand, Pielke, and Beck 2011; Valkenburg 2020). And while still few in number, some scholars are exploring the relevance of agonism to STS (Crawford 2016; Popa, Blok, and Wesselink 2020; Van Bouwel and Van Oudheusden 2017). In that spirit, I now turn to RRI, not just as an example of the limits of deliberative democracy, but as an opportunity to explore alternatives.

Toward an Agonistic RRI

Imagining how institutions could be agonized, Lowndes and Paxton (2018) identify contingency as a vital principle. Thus, rather than providing a model of "best practices" for an agonistic RRI, in this section I attempt to think through some potential characteristics. How could this choice of theory influence how RRI is used to engage with research and innovation, how those of us involved in RRI understand our roles, and how we think of inclusion?

Transform Power Relations

Agonistic pluralism recognizes that power cannot be transcended. Unlike in deliberative democracy, there are no processes promising to take power off the table. Instead, the ideal agonistic process seeks to put in place democratic structures that will enable relations of power that are more just. One way to approach this is by making power relations in contemporary science and technology an empirical question. Joly (2015) has urged STS scholars to focus more on power in the present and less on visions of the future; by focusing on novelty and the reflexivity of individual scientists, he argues that we help to obscure existing asymmetries of power. RRI could serve as an entry point for conducting research

exploring who benefits, who stands to harm, and whose voices are heard. Research undertaken as RRI could foreground the political stakes of the creation and use of knowledge, making these more visible and hence accountable. This will only be possible if RRI is established as a space for research as well as praxis, and one that is able to examine a broader context than the individual lab or project at hand.[12]

Acknowledging existing power relations could also influence how RRI projects are designed and implemented. When setting up dialogues and engagements, we should not present a supposedly neutral space of discussion in which power has been bracketed aside. Valkenburg (2020) describes a project in India on biogasification of rice straw in which RRI practitioners convened different stakeholder/knowledge groups for internal discussion to identify problems around biogasification. "This provided a safe space where knowledge could be shared, and first corroborated within its own validation systems before we would take it out and confront it with other knowledges" (Ibid., 348). An agonistic RRI would aim for exactly this degree of care and thought in navigating power relations.

Seek Out Dissent

One of RRI's signatures is the call to engage in scientific processes "upstream," rather than waiting for problems to manifest once new products are launched into the world. This has been framed as a way to avoid conflict. What if, instead, upstream engagement was understood as a way to identify and even provoke conflicts, in the process forming new communities, alliances, and alignments of power?

[12] These suggestions come from an RRI Framework that colleagues and I developed for the ERA CoBioTech programme (see note 2).

Controversies can trigger the formation of "publics," groups that identify as indirectly but seriously affected by a human activity (Dewey 1927). Noortje Marres (2007) amends Dewey's definition to actors "*jointly and antagonistically* implicated in issues"; it is in rendering explicit the "mutual exclusivities" between groups that a public's participation is truly valuable (2007, 773; emphasis in original).

Synthetic biology connects to many long-standing debates—from the goals and means of medical research to how best to feed the world, from corporate consolidation to what constitutes adequate governmental oversight. Many who identify as stakeholders in those debates are not aware of synthetic biology. What if one of the tasks of an RRI practitioner was to help identify the conflicts and controversies to which a scientific project might be relevant? The space of RRI could be used to help people develop passionate identities as political publics around issues relevant to our scientific projects. We might invite interdisciplinary researchers, commercial entities, activists, faith groups, and others to sit down with the aim of determining where there is *not* consensus, where the mutual exclusivities actually lie.

This might feel uncomfortable or just sound unrealistic. But if we stop promising consensus, as I believe we should, it is what we can offer instead. Van Bouwel and Van Oudheusden (2017) call for the goal of disclosure rather than consensus and closure. They describe this as seeking to articulate the views that underlie competing claims, using deliberation to draw out conflict. This can "bring into view the vast plurality of epistemic interests, concerns, and priorities in science and technology" (Ibid., 509). Rather than promising to smooth over conflict, we could propose to help identify for a given technoscience some of its political issues that must be dealt with on political terms.

Make Room for the Political

The Deliberation Aid introduced earlier is not apolitical; it walks its users through a series of questions that draw out the value-laden choices and political commitments of synthetic biology research and commercialization. But the personas, meant to allow users to better understand differing opinions without directly interacting with such people, shift the Aid to the plane of privately-held morals.

And yet, in the numerous clashes over synthetic biology that I saw in my decade of work, it rarely seemed to me that privately-held moral positions were the root of those conflicts. Those involved in synthetic biology debates mostly would agree that their opponents legitimately may hold differing stances on, say, the sanctity of life and what this means for genetic engineering. But do they hold that differing knowledges, epistemologies, and power relations may legitimately lead to radically different visions of science and society? That these visions are a legitimate basis upon which to engage and question certain aspects of research and innovation? In the context of new and emerging science and technologies, I believe these are necessary points of recognition in order to have political debate between legitimate political adversaries.

To make space for such a debate, perhaps one of our roles can be to help scientists recognize that their field has a "common sense" and identify the work and resources it takes to keep such seemingly obvious truths sedimented. Happily, this is one of the things STS does best; it seeks to disarticulate the power structures grown up around specific narratives of science and technology's development, use, and impacts.

This won't be easy. Especially in the face of the most common power dynamics of RRI: a lone social scientist, often early career, dropped into a project with researchers who receive many, many times more money on the shared grant and are extremely busy delivering on the promises of said grant (for reflections on STS dynamics with collaborators, see Viseu 2015). If one's inclusion is meant to ward off politicization and one's position is already precarious, what is an RRI practitioner to do? [13]

If only early career researchers on RRI contracts are seen as responsible for RRI, they will carry all the risk of pushing for change. This must be a project for the larger STS community; STS must take responsibility for RRI. Practically, this means senior STS scholars providing support for the "RRI practitioners" attached to research projects at the same university. It means claiming RRI as part of STS research and recognizing where it produces results of interest to STS. In the UK, the STS community engaged around synthetic biology has deliberately nurtured communication and thinking amongst its members. Such camaraderie and connection are our best tools to shift institutional dynamics of power and create space for things to be otherwise.

Conclusions

Time moves quickly, both for research funders and academic fields. The pressures of commercialization arguably have already shrunk synthetic biology's desire if not capacity to offer a new vision of biology. RRI may have already sedimented into a depoliticized checklist of activities meant to support laboratory research. Funders are starting to move on from RRI to the next fad in science policy.

[13] Thanks to the peer reviewer who raised this question.

And yet, every hegemonic order is susceptible to disruption and disarticulation. While there is still a space for "society" in biotechnology funding streams, there are choices to be made concerning how we will operate within it. In exploring these options, we must choose what theory will guide us. Perhaps delivering a truly agonistic RRI will turn out to be no more possible than an RRI that provides the conditions for ideal speech, but it is a choice of theory that would shift our goals and thus how we measure success. We would seek to open up dialogue in order to provide space for political debate, rather than aiming to legitimate its outcomes. Instead of offering RRI as a way to resolve controversies, we would promise our collaborators to work with them to build processes for the on-going negotiation of difference.

Agonism and deliberative democracy are not the only options of theory for RRI. Some may want to focus on developing a pragmatist RRI, with an aim to "make persistent conflicts manageable" by breaking up dualisms through common-ground dialogues (Keulartz et al. 2004, 23). Others may want to look beyond democratic theory altogether—what insights could be brought from anarchist geography (eg: Springer 2011)? Ideally, RRI will become a space of engaged pluralism, with different models for doing RRI, different reasons for engaging with publics, and therefore different approaches to engagement. Above all, let us be deliberate in choosing the political theory informing our work.

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