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Does Controversial Science Call For Public Participation? The Case Of Gmo Skepticism

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Article abstract

Many instances of new and emerging science and technology are controversial. Although a number of people, including scientific experts, welcome these developments, a considerable skepticism exists among members of the public. The use of genetically modified organisms (GMOs) is a case in point. In science policy and in science communication, it is widely assumed that such controversial science and technology require public participation in the policy-making process. We examine this view, which we call the Public Participation Paradigm, using the case of GMOs as an example. We suggest that a prominent reason behind the call for public participation is the belief that such participation is required for democratic legitimacy. We then show that the most prominent accounts of democratic legitimacy do not, in fact, entail that public participation is required in cases of controversial science in general, or in the case of GMOs in particular.

DOES CONTROVERSIAL SCIENCE CALL FOR PUBLIC PARTICIPATION? THE CASE OF GMO SKEPTICISM

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ABSTRACT:

Many instances of new and emerging science and technology are controversial. Although a number of people, including scientific experts, welcome these developments, a considerable skepticism exists among members of the public. The use of genetically modified organisms (GMOs) is a case in point. In science policy and in science communication, it is widely assumed that such controversial science and technology require public participation in the policy-making process. We examine this view, which we call the Public Participation Paradigm, using the case of GMOs as an example. We suggest that a prominent reason behind the call for public participation is the belief that such participation is required for democratic legitimacy. We then show that the most prominent accounts of democratic legitimacy do not, in fact, entail that public participation is required in cases of controversial science in general, or in the case of GMOs in particular.

RÉSUMÉ :

Beaucoup d'avancées scientifiques et de technologies émergentes sont controversées. Bien qu'un certain nombre de personnes, incluant des experts scientifiques, sont favorables à ces développements, la population demeure largement sceptique. Le recours aux organismes génétiquement modifiés (OGM) illustre une telle situation. Dans les politiques et communications scientifiques, il est largement tenu pour acquis que de telles controverses scientifiques et technologiques requièrent la participation publique dans le processus de prise de décision politique. Nous examinons ce point de vue, que nous appelons le paradigme de la participation publique [*Public Participation Paradigm*], en nous servant du cas des OGM. Nous suggérons qu'une raison centrale en faveur de l'appel à la participation publique se situe dans la croyance qu'une telle participation est requise par la légitimité démocratique. Nous montrons ensuite que la plupart des principales conceptions de la légitimité démocratique n'impliquent pas, en fait, que la participation publique puisse être requise pour les controverses scientifiques en général, et pour les OGM en particulier.

1. INTRODUCTION

In science policy and in science communication, it is widely assumed that controversial science requires public participation. In part, the background for this assumption is the experience of widespread public skepticism about the use of genetically modified organisms (GMOs). The initial assumption that public skepticism would be replaced by wide social acceptance once relevant information was provided to the public was quickly shown false. In response to the failings of this earlier approach, the view that extensive public participation both in the design of science policy and in policy-making processes in general was desirable gained popularity. The general idea expressed in writings on public participation is roughly that technology policy should be democratized—meaning that the skeptical public and the enthusiastic scientific community should debate their disagreements about controversial science and technology on an equal footing, and that policy makers should take the results of these joint deliberations into account when making decisions in the realm of controversial science. We call this the *Public Participation Paradigm* (PPP), and explain it more fully below. Legislation governing research and commercial use of GMOs is an area in which PPP would apply. Our aim in this paper is to offer a critical discussion of PPP, particularly of ways in which the paradigm might be defended, with the GMO case as an example. We will argue that, while widely endorsed, the Public Participation Paradigm is not well supported by currently influential theories of political legitimacy, and that this presents a challenge to the paradigm.

2. GMO SKEPTICISM

Public debate as well as empirical research establishes that there is considerable public skepticism (at least in the EU) about the use of genetically modified organisms (GMOs) in food production. This skepticism is mainly fuelled by concerns about unnaturalness (GMOs are considered to be unnatural, or to be produced by unnatural methods, or to be equal to playing God, and therefore to be morally objectionable), risk of adverse consequences (GMOs are perceived as involving unacceptable health risks or environmental risks), and a variety of socioeconomic consequences (risk of exploitation, monopolization, threats to traditional life forms) (see, e.g., Eurobarometer, 2010, pp. 18-32; Gaskell et al., 2010, pp. 36-39; Thompson, 2015, p. 201). For the sake of simplicity, let us refer to this broad class of views as GMO *skepticism*, and to the particular concerns that GMO skepticism is based upon as the *naturalness objection*, the *risk objection*, and the *social justice objection*, respectively.

As is familiar, scientists and some hard-nosed philosophers routinely reject GMO skepticism as irrational and ill informed (see, e.g., American Association for the Advancement of Science, 2012; Comstock, 2000, Ch. 5 & Ch. 6; Holtug, 2009; Thompson, 2011). For example, the naturalness objection is often dismissed as inconclusive and incoherent—it is difficult if not impossible to make satisfactory sense of the basic premise of the argument that something can

be morally bad merely in virtue of being unnatural. The risk objection would be cogent, were it not for the fact that no solid evidence have been forthcoming in the vast scientific literature that any such risk exists (National Academy of Sciences, 2016).[1] The social justice objection asserts that a range of unwanted economic consequences may follow from the use of GMOs in agriculture—for example, that large corporations may acquire monopoly power over central parts of the global food production system. These concerns are entirely reasonable. But, it may be replied, they are not specific to the use of GMOs as such—they apply to many technological innovations in agriculture and beyond (see Thompson 2007, Ch. 8). More importantly, whether unwanted socioeconomic consequences are likely to occur depends entirely on how the surrounding legislation (concerning, e.g., intellectual property rights, competition law, global trade rules, and broader food policy) is designed. As a result, the move from social justice concerns to an outright rejection of GMOs is tenuous. The use of GMOs is consistent with social justice, given the right legislation. And if one is really concerned about improving social justice in agriculture, focusing on GMOs is at best blinkered and at worst a red herring. So the distributive justice objection, while valid, misfires if it is used to support a general rejection of the use of GMOs.

This very brief presentation does not do justice to GMO skepticism or to the arguments against it made by scientists and philosophers. However, our aim is not to discuss GMO skepticism or the several different objections in any detail. Rather, we want to consider what should be done about the seeming conflict playing out between a skeptical public and at least parts of the science community. Given that sections of the public persistently disagree with the relevant experts about the cogency of the objections that give rise to GMO skepticism, how should democratic societies deal with such skepticism?

3. THE PUBLIC PARTICIPATION PARADIGM

A widely held view is that the conflict between scientists and skeptical citizens requires extensive public participation in the contentious parts of the policy-making process. Both public policy using contentious science and the science policy regulating that science can be covered by this demand. This view is what we call the *Public Participation Paradigm* (PPP). The PPP arose largely as a consequence of perceived weaknesses in earlier approaches to the relationship between science and the public. It will therefore be instructive to briefly recount the historical evolution of the PPP before we discuss the view systematically. We rely in the following on a number of accounts by Boerse & de Cock Buning (2012), Gregory & Lock (2008), Lock (2008), Bauer (2009), and Rowe & Frewer (2000).

3.1 The evolution of the Public Participation Paradigm

An initially dominant approach to public skepticism about scientific and technological developments assumed that the problem lay in a lack of public knowledge about the science. In the case of GMOs, this approach seemed

initially plausible: if only the public were better informed about the nature of GMOs, they would appreciate the benefits of GMOs, as well as the lack of genuine disadvantages. If the public were better able to reason about moral issues, then public skepticism would vanish or at least decrease. This position is what is sometimes referred to as the *deficit model*. The assumption in the deficit model is that skepticism towards technological developments is caused by a deficit in knowledge or rationality. However, sociologists have long pointed out that the deficit model does not provide an accurate picture of why public skepticism exists. An early empirical study revealed that increased knowledge of science was correlated with *less* favourable attitudes towards controversial science and technology, although also with *more* favourable attitudes towards noncontroversial technologies and towards science in general (Evans & Durant, 1995). Subsequent research has largely corroborated this conclusion (Allum et al., 2008; Sturgis & Allum, 2004). In the specific case of GMOs, the available empirical studies likewise do not uniformly find a correlation between higher levels of knowledge of GMOs and more positive attitudes towards them, and where studies have found correlations these have been relatively weak (Ahteensuu, 2012). Indeed, there is some evidence suggesting that more knowledge of GMOs is correlated with *more* skeptical attitudes (Eurobarometer, 2010, p. 18-32).[2] In general, the evidence suggests that the relationship between knowledge and attitudes towards controversial technologies is complex and is mediated by other factors, but it is fairly well established that simply improving people's knowledge will not alleviate skepticism towards GMOs or other controversial technologies.

Partly in reaction to the weakness of the deficit model, the view that increased public participation in the decision-making process regarding new science and technology is called for has gained popularity. If lay citizens' views about the desirability of scientific and technological developments are not simply expressions of ignorance or error, it has been argued, then democratic ideals seem to require that they be considered on an equal footing with the views of scientific experts (Durant, 1999; Fisher, 1999). This goes for both judgments about risks and likely consequences of using GMOs, on the one hand, and judgments about what moral views are rationally tenable, on the other. Public participation was suggested early on by prominent social scientists (e.g., Dryzek, 1989; Fischer, 1993; Wynne, 1991; Ziman 1991) and the general public-participation idea has since become widely accepted among scholars and policy makers, at least in Europe (e.g., Irwin & Wynne 1996; Winickoff et al. 2005; Jasanoff 2003, Nowotny 2003; see discussion and more references in Ahteensuu 2012). Summarizing this development, Gregory and Lock (2008, p. 1257) write:

> Ignorant or not, it was argued, the public should have opportunities to engage with the institutions of science in ways that took account of their views; and scientists should have opportunities to engage with the public to listen and learn as well as speak and teach. Where before the science–society issue had been conceptualised as a combative encounter between knowledgeable experts and ignorant lay masses, now, it became a collective exercise of citizenship in a participatory democracy.

The general theme expressed in writings on public participation is roughly that the skeptical public and the enthusiastic scientific community should debate their disagreement about GMOs on an equal footing, and that policy makers should take the results of these joint deliberations into account when making decisions in the realm of controversial science. As indicated, this is what we call the Public Participation Paradigm (PPP). Legislation governing research and commercial use of GM crops is a prime example of an area in which PPP would apply. Our aim in this paper is to offer a critical discussion of PPP, particularly of the ways in which the paradigm might be defended.

3.2 Justifications for The Public Participation Paradigm

The PPP is both widespread and highly influential, but it is not a view that one easily finds stated by proponents in a philosophically precise and detailed way, much less accompanied by a detailed philosophical justification. Most of the arguments for PPP are closely bound up with arguments *against* alternative models of policy-making—especially the deficit model and 'technocratic' approaches such as risk-cost-benefit analysis (Durant, 1999, p. 315; Stirling, 2008, p. 267).[3] In an influential paper, Fiorino (1990) identifies three types of argument against a "technocratic orientation" (arguments that are simultaneously arguments *for* increased inclusion of lay citizens in the policy-makin process): instrumental, substantive, and normative arguments (see also Stirling, 2008, pp. 268-273, and a similar, but slightly different classification in Durning, 1993). On an instrumental conception, public participation is desirable because it is thought to generally promote some independent aim. Commonly cited aims include securing public trust in the institutions that govern new technologies and ensuring public support (or at least acceptance) of a technology. But one might also speculate that public participation is sometimes promoted by technology-skeptic groups *because* it is likely to slow down or stop an unwanted technological development, such as the development and proliferation of GMOs in food production. On a substantive view, public involvement is desirable because it promotes an epistemically more qualified view of possible harms and benefits that may ensue from GMOs, and a better grasp of the normative issues at stake—for example, by including the experiences of those directly affected by the technology.

We will not discuss or question the instrumental or substantive rationales for PPP. Instead, we focus on normative justifications for PPP. In particular, we focus on the most important and widespread normative argument for PPP, namely that democratic legitimacy requires substantial public participation in the policy-making process—or at least that such public participation contributes significantly to the democratic legitimacy of the policies and governance that might eventually be enacted. More specifically, we assume that PPP is associated with two claims about democratic legitimacy of funding and governance of controversial science. First, processes recommended under PPP can contribute significantly to the democratic legitimacy of policies regarding funding and governance of controversial science. Second, ordinary democratic processes will

inevitably leave a significant legitimacy gap as regards the public policies governing controversial science—that is, in the absence of PPP-recommended processes, the policy-making process will be insufficiently legitimate.

The lack of a single precise and detailed defence of PPP on democratic grounds means that we must rely on what we take to be a reasonable rendering of PPP. The lack of precise definitions and justifications of PPP unavoidably gives our discussion a partially hypothetical character. We will systematically consider various ways in which PPP, as we conceive it, may be justified, and we hope that our systematic examination of a range of possibilities will be helpful. For the purposes of the following discussion, we will characterize PPP as follows:

> *The Public Participation Paradigm* (PPP): Democratically legitimate public policy and governance of controversial science requires special deliberative processes (in addition to ordinary democratic processes), featuring representatives from the public and from science, debating factual and normative issues on an equal footing, and issuing policy recommendations that should have significant normative weight for policy-makers.

A renowned, and in many ways paradigmatic, instance of a process licensed by PPP is the consensus conference (Joss & Durant, 1995). A consensus conference roughly proceeds as follows (our account here relies on Zurita, 2006; see also Andersen & Jæger, 1999; Nielsen, Lassen & Sandøe, 2007). A panel of experts and a panel of lay people get together over (typically) three or four days to debate some potentially controversial technology. The panel of lay people is chosen to be representative of the general population in terms age, gender, education, etc. Initially, the expert panel presents the scientific facts about the technology to the lay panel (which has been briefed so as to be able to ask experts for information they deem important). After this presentation and questioning, the lay panel debates, and drafts a recommendation for how the technology should be developed and regulated. This draft is reviewed by the experts to clear up factual errors and misunderstandings, and it is then presented to parliament in an official report. The aim of these conferences is thus to inform legislators of "the attitudes, hopes and concerns of the public" (Zurita, 2006, p. 20).

Another domain where PPP has been and is influential is science communication. Recent theorists propose that science communication should not be viewed as a one-way street, where the public receives information about the progress and potentials of science. Rather, science communication should essentially be conceived as a conversation between members of the public and members of the science community, where these are considered equals. So, according to this view, science communication is a vehicle for special participatory processes involving science when it is controversial, and it is reasonable to assume that this idea could also be motivated by PPP (see Bauer 2009 and Gregory & Lock 2008 for reviews of the various stages of thinking of the point and purpose of science communication).

As we prefer to think of it, PPP does not plausibly assume that designated public participatory processes such as consensus conferences or citizen hearings should *replace* ordinary democratic processes of public deliberation and democratic decision making. Rather, they should supplement those processes. Similarly, the idea is not, of course, that the outcome of designated public-participation processes should replace the formal authority of the parliamentary system to enact laws, etc.—consensus conferences should not supplant parliaments. Rather, consensus conferences and other ways of eliciting public opinion would represent a normatively significant input to policy makers in parliament and government. These decision makers would be morally at fault, or the decision procedures would be morally wanting, if they did not attach some significant weight to the outcome of such processes when formulating policy, though of course decision makers are not legally bound to respect the decisions of a consensus conference.

4. SHOULD WE ACCEPT THE PUBLIC PARTICIPATION PARADIGM?

While the Public Participation Paradigm has been widely accepted, our aim here is to offer a critical discussion of its justification—in particular, a discussion of whether PPP is normatively (that is, democratically) justified. We argue that, despite its popularity, it is actually difficult to mount a defence of PPP based on the most influential current views on democratic legitimacy. This conclusion at least presents a challenge to PPP and its proponents.

When we talk about democratic legitimacy here and below, we use a notion of legitimacy that is common in a broadly Rawlsian tradition (more about Rawls below). As Rawls observes, contemporary liberal societies inevitably feature a plurality of irreconcilable and comprehensive doctrines that underlie disagreements about which coercive policies are just, right, or best (Rawls, 1993). When we cannot reach agreement on what policies are just, right, or best, we should look for policies that are at least legitimate. Legitimate policies in a sense serve to reconcile our conflicting views about what would be right or just—the hope is that it is within our reach to come to agree that a particular policy is legitimate, even when we continue to disagree about whether it is just or right, or the best policy on the issue. Furthermore, acknowledging that a particular policy is legitimate should command some sort of respect, even among those who do not agree that it is the best or the right policy. It is this familiar concept of legitimacy that we assume here (see Estlund, 2008; Nagel, 1987; and Peter, 2009 for similar ways of conceiving of legitimacy).[4]

As we shall see in a moment, most theories of political legitimacy, including the theories that we shall be concerned with, assume that political legitimacy, in one way or another, requires that policies reflect the wills or preferences of those governed. Legitimate policies are those that win some form of qualified consent from those affected, even from those who think that the policies are not right, just, or best. This concept of legitimacy must be distinct from the concepts of rightness, justness, and optimality: since legitimacy is intended to serve what

Wall (2002, p. 387) calls a "reconciling function" in societies characterized by reasonable disagreement about what the right, just, or best policy is, it cannot be a requirement of legitimacy that policies be as a matter of fact right, just, or optimal. Note also that the fact that legitimacy requires *qualified* consent means that it is different from actual public support. A policy may have broad public support, and yet not be legitimate—say, if the public support has been garnered in deceptive and manipulative ways, or is based on false assumptions.

4.1 The Principle of Legitimacy

We will now consider various ways in which one might justify PPP in more detail. Our approach will be to review the most influential theories of democratic legitimacy, and then examine whether they support PPP. We argue that they do not. While PPP is quite popular, none of the currently influential theories of legitimacy supports PPP, at least as far as the case of the GMO controversy is concerned. If correct, this represents an important challenge to PPP.

The broad class of theories of democratic legitimacy that we will be concerned with endorse the following (Rawls 1993, p. 137, Waldron 1987, p. 128, Nagel 1991, p. 3, Gaus and Vallier 2009, p. 53).

> *The Principle of Legitimacy*. Policies are legitimate if and only if everyone affected could reasonably accept the policies (or could not reasonably reject them).

While PPP is not entailed by the Principle of Legitimacy, it may certainly seem that the Principle of Legitimacy supports PPP. However, closer inspection reveals that this is not so. The Principle of Legitimacy needs to be qualified in a number of ways to be plausible (or even interpretable). We argue that once we consider these qualifications, it turns out that the Principle of Legitimacy does not support PPP in the case of the GMO controversy.

Crucially, the qualifications needed for the Principle of Legitimacy concern the proper interpretation of the phrase 'reasonably accept.' Clearly, this clause cannot simply mean acceptance, as the principle would then say that policies are legitimate if and only if they are accepted by everyone involved. This would imply that policies that are rejected by some for reasons of blatant irrationality would count as not democratically legitimate. As one proponent puts it, "democratic governments should respond to people's values, not to their blunders" (Sunstein 2005, p. 126). Thus, one obvious, and familiar, way of interpreting the Principle of Legitimacy is in terms of hypothetical acceptance. On this view what matters for legitimacy is hypothetical acceptance, not actual acceptance. So, reasonable acceptance in the Principle of Legitimacy denotes just a specific form of hypothetical acceptance. Let us say that a subject S hypothetically accepts (in this, reasonable-acceptance sense) a policy if and only if S would have accepted it were S fully rational and fully informed about the relevant facts.

At first sight, it might seem that the hypothetical acceptance interpretation of the Principle of Legitimacy is congenial to PPP: the very idea is that lay citizens will be involved in a process of deliberation in which they will form views that are coherent and informed by the facts. The resulting views will thus be more rational and epistemically qualified. However, it is questionable whether PPP, when defended by the hypothetical acceptance interpretation of the Principle of Legitimacy, will do justice to the public skepticism we actually find: if the naturalness objections are hard to make sense of, and if worries about adverse effects of GMOs are misinformed, then we should infer that people's hypothetical (reasonable) judgments about policies should not be based on these stances. The hypothetical acceptance interpretation thus restricts the scope of PPP, since it does not justify the accommodation of citizens' actual views, "ignorant or not" (Gregory and Lock, 2008, p. 1257). The hypothetical acceptance interpretation of the Principle of Legitimacy would thus not support PPP as a vehicle of expression of at least some socially important forms of public skepticism (such as GMO skepticism). Consequently, the ideal that lay citizens' apprehensions and scientists' enthusiasm about GMOs should be treated as being of equal validity could not be upheld; and the very fact that GMOs are controversial would not in itself provide a reason for public participation. Furthermore, if PPP were to be a proxy of hypothetical acceptance, we should take steps to ensure that PPP approximates the ideals of full rationality and full informedness. This seems to reintroduce the view that the deficit model invited, namely that citizens need to be educated—only the means for education have changed. This is exactly the view that proponents of PPP do not want. It might be suggested that deliberation in diverse groups carries epistemic benefits that would make such education superfluous. The suggestion would be that when citizens deliberate with one another in diverse groups, they tend to give up unnaturalness objections and the risk argument, making PPP a good proxy for hypothetical acceptance. Again, this would turn the justification of PPP into a version of the deficit model.

None of this is to say that a version of PPP that self-consciously aims to determine the possible reasonable views on a controversial technology is not possible or desirable. But it seems to us, at least, that hypothetical acceptance interpretation of PPP would not do justice to the strong demands for equality between experts and lay citizens that is a frequent part of defences of PPP. Furthermore, if this is the aim, then that should be made explicit, and efforts should be made to design participatory institutions in a way that is conducive to it.

4.2 Rawls's political liberalism

Let us return now to the Principle of Legitimacy. A different interpretation of the Principle of Legitimacy is due to Rawls, and put forward in his influential book *Political Liberalism*. The basic idea is that democratically legitimate policies should reflect our shared commitment to the basic values of liberal democracy (values that are related to respecting one another as free and equal persons).

Rawls writes: "Our exercise of political power is proper only when we sincerely believe the reasons we offer for our political action may reasonably be accepted by other citizens as a justification of those actions" (Rawls 1993, p. xlvi). We interpret Rawls as proposing the following restraint on 'reasonable acceptance' in the interpretation of the Principle of Legitimacy: as citizens, we can offer only reasons that we reasonably and sincerely believe that other reasonable citizens can accept. In our justification of coercive policies, we cannot offer reasons that we know that other reasonable individuals do not accept. Public reasons are the set of reasons that meet this requirement—that is, the reasons that are shared by or acceptable to all reasonable comprehensive views. The set of public reasons is thus the intersection of the sets of reasons that are acceptable from each reasonable comprehensive view. A comprehensive view is a view that covers all or at least a wide range of metaphysical, religious, and moral questions. A comprehensive view is reasonable, according to Rawls, if it arises from the conscientious and correct application of theoretical and practical reason, and supports the liberal political conceptions. Since many difficult and subtle judgments go into formulating a comprehensive doctrine, we cannot expect all who use reason correctly and conscientiously to end up affirming the same comprehensive doctrines. Since we differ in our reasonable comprehensive views, not all parts of comprehensive views are part of the set of public reasons. So the restraint on public reason proposed by Rawls implies that some citizens will be prevented from expressing parts of their comprehensive views when seeking to justify coercive public policy—they are bound to restrain themselves to the parts of their comprehensive views that overlap with the comprehensive views of others.

Rawls also proposes a restriction in scope of the Principle of Legitimacy in that he suggests that it applies only to constitutional essentials and matters of basic justice. Arguably, legislation and governance of GM crops are not matters of constitutional essentials or basic justice. Some theorists have argued that it is difficult to justify restricting the application of the Principle of Legitimacy to cover only constitutional essentials—coercive legislation that does not belong to constitutional essentials may, it has been argued, be equally in need of public justification, and the Principle of Legitimacy should therefore be expanded to cover all legislative decisions (Quong 2011, p. 273-289). Others have pointed out that the distinction between constitutional essentials and ordinary legislation is impossible to maintain, since almost any piece of ordinary legislation could have some bearing on constitutional essentials (Habermas 2008, p. 123 fn.18; Greenawalt 1995, p. 1306-1308).[5] We will set this issue aside without taking any stance on it, but for the sake of argument we will simply ask what the implications would be if GMO legislation were required to be justifiable by Rawlsian public reasons. In particular, we ask whether PPP would be supported by such a requirement.

The implication of Rawls's view on public reason is that certain parts of our comprehensive views are excluded from public reason, no matter how sincerely held. Coercive policies must be justified by reasons shared by all. Our wider

normative, religious, and metaphysical commitments, which form our comprehensive views, contain elements that are not part of the set of public reasons, in so far as they are not shared by all reasonable citizens. These are sectarian or private views that are to be excluded from public reason. The view that GMOs are unnatural and therefore morally problematic would very likely not be part of public reason for Rawls, and so the naturalness objection cannot be part of what justifies public policies.[6]

Furthermore, Rawls assumes that public reason must include methods and results from science. As he writes, citizens "are to appeal only to presently accepted general beliefs and forms of reasoning found in common sense, and the methods and conclusions of science when these are not controversial" (Rawls 1993, p. 224). It is not clear from Rawls's writings how this criterion is to be interpreted. In particular, he does not say whether he has narrow intrascientific controversies in mind, or broader controversies involving established science on one hand, and a skeptical public on the other (Jønch-Clausen & Kappel, 2016). Clearly, according to the first narrow interpretation, only factual assumptions that are consistent with the methods and conclusions of science that are not controversial within the relevant scientific communities are part of public reason. This view would imply that views based on ignorance about the scientific consensus on the evidence of the safety of GMOs would be ruled out as parts of public reason, and on this interpretation PPP would be problematic. On the broader interpretation, methods and conclusions of science are excluded from public reason when they are subject to broader controversies, even if there is a consensus in the scientific community. This is an underdiscussed problem in the literature on public reason. The immediate implication of the broad interpretation would seem to be that both the view that GMOs are safe and the view that they are risky would be excluded from public reason.[7] So any policy or governance of GMOs would have to be based on other public reasons, or on shared reasons regarding decision making when a product's safety status is uncertain (if such are available).

So PPP is not warranted by appeals to a Rawlsian understanding of legitimacy as we have interpreted it. Quite the contrary, in fact: policy makers are obligated to disregard many of the views that are currently widely held by citizens, since these are not acceptable to some reasonable citizens.

Not everyone agrees that a plausible interpretation of Rawls on public reason implies that the naturalness objection should be excluded from public reason. In their instructive paper, Streiffer and Hedemann (2005) cite a number of influential authors (e.g., Comstock, 2000; Rollin, 1995; Thompson 2007 [1997]) who in various ways argue that what Streiffer and Hedemann refer to as intrinsic objections to GMOs have no role in public justification of policy since they are reasonably rejectable by reasonable comprehensive doctrines—that is, they are not part of the set of public reasons as we have defined it above. Intrinsic objections are objections pertaining to the very act of genetically modifying organisms, rather than to adverse effects. The most common intrinsic objections are

the naturalness objection and its theological cousin, the playing-God objection. But, Streiffer and Hedemann argue, since views about nature, naturalness, and even quasi-religious reasons for GMO skepticism are themselves part of some reasonable comprehensive doctrines, they cannot be excluded from public reason. Thus, excluding them as legitimate reasons for having certain regulatory frameworks and approval procedures would be illegitimate.

We will now consider this argument. In a crucial passage on the nature of public reason, Streiffer and Hedemann write:

> A reason for a political decision may reasonably be accepted by others as a justification for that decision only if it is consistent with those citizens' reasonable comprehensive doctrines. Thus, the principle of legitimacy says that legitimate political decisions must be justifiable in terms that are consistent with the reasonable comprehensive doctrines of the citizens governed by them. (2005, p. 196)

This sounds very much like our exposition of Rawls's theory of public reason above. However, this, and like passages, lead Streiffer and Hedemann to advance an argument which we suggest can be rendered as follows:[8]

> (1) Public reason is the set of reasons that are consistent with all reasonable comprehensive views.
>
> (2) Intrinsic objections (in particular the unnaturalness objection and the playing-God objection) are part of some reasonable comprehensive views.
>
> (3) Therefore, the rejection of intrinsic objections is inconsistent with some reasonable comprehensive views.
>
> (4) Therefore, the rejection of intrinsic objections is not part of public reason.
>
> (5) So the naturalness objection and the playing-God objection cannot be legitimately excluded from public reason.[9]

So, Streiffer and Hedemann conclude, the intrinsic objections, or the views and values underlying them, should be "viewed as constraints on acceptable justifications for public policy about GE food" (2005, p. 206). And, they suggest, "the intrinsic objections will need to be weighed against other morally relevant factors, such as possible beneficial or harmful consequences" (p. 207). Moreover, rather than rejecting that intrinsic objections can be accorded any role in the justification of public policies, we should promote "a shift towards more majoritarian decision-making procedures, and, more broadly, a shift towards taking into account the level of public support for a given policy option" (*ibid.*), which would give more appropriate weight to intrinsic objections, and to citizens

holding these views. Finally, we should seek to accommodate intrinsic objections "without compromising other important political values." In the case of GMOs used in food, this points towards a compromise "allowing GE food, but with mandatory labeling" (p. 208).

We contend that this argument is based on an unusual and untenable interpretation of Rawls's thinking on public reason. Recall that, on the Rawlsian view, policies must be justified by reference only to reasons that are shared among all reasonable comprehensive views. The set of public reasons is, as we said above, the *intersection* of the sets of reasons that each reasonable comprehensive doctrine affirms. If—as we will assume, and as Streiffer & Hedemann assume—neither the intrinsic objections nor their rejection is affirmed by every reasonable comprehensive view, then neither the objections nor their rejection falls into this intersection. But the consequence of this, on a Rawlsian view, is that intrinsic objections must be set aside as not part of public reason, as must the assumption that intrinsic objections are misguided or mistaken. *Neither* can figure in the justification of public policies. Thus when Streiffer & Hedemann move from (4) to (5), they are misinterpreting (or they go beyond) the Rawlsian view. Consequently, it is not true that the intrinsic objections are constraints on acceptable justifications. What remains as reasons that may justify public policy is the secular (nonmetaphysical and nonreligious) concerns that we all agree about—e.g., concerns for liberty, equality, well-being, and risk and harms to humans and animals. As we pointed out above, this would exclude significant parts of what actually motivates public skepticism about GMOs in food production, and so would not support PPP in the case of public skepticism about GMOs.

4.3. Inclusive public-reason theories

Rawls's narrow conception of public reason has been criticized, in particular on the grounds that it prevents religious citizens from publicly offering the reasons that they find most important to themselves (Greenawalt 1995, Wolterstorff 1997, Eberle 2002, Perry 1988, Weithman 2002). Those attracted to the naturalness objection may voice the same complaint. Rawls's restrictive view of public reasons implies that the naturalness objection cannot justify public policies, and yet this very objection may be an important reason for some citizens to require restrictive legislation concerning GM crops.

It is worth considering public-reason theories that are more inclusive in that they reject Rawlsian restraints on public reason. An influential such theory is proposed by Gaus and Vallier (Gaus and Vallier 2009; see also Gaus 2011, Vallier 2011). According to Gaus and Vallier, coercive legislation is legitimate only if it can win the assent of everyone concerned, or be justified for everyone concerned. This is, of course, in broad agreement with the liberal tradition. However, what matters for assent and justification is convergence, not consensus. So citizens need not agree on the same reasons or rationales for coercive legislation. Instead, each of us must accept the legislation for his or her own reasons (i.e., we must converge on the policy outcome).[10] Hence, according to

Gaus and Vallier, we should reject the Rawlsian constraint that one can offer only reasons that one believes that other reasonable citizens also affirm. Any reason can be offered in the process of deliberation and justification—the only minimal requirement is that a reason being proposed be comprehensible as a reason to others. It is incompatible with respect for one's fellow citizens to offer reasons that are not comprehensible to them as reasons.

This should be understood on the basis of what Gaus and Vallier call the Liberty Principle, stating that "liberty should be the norm, [respect for persons as free and equal requires that] coercion always needs some special justification" (Gaus and Vallier, 2009, p. 53; Gaus and Vallier take this formulation from Joel Feinberg (1987, p. 9) and the square brackets are theirs). So the basic idea is that an absence of coercive legislation is legitimate by default, and that any deviation from this state in the form of coercive legislation requires the consent of everyone. There is, as one might say, a presumption in favour of liberty.

Clearly, this view implies that the naturalness objection is admissible as a part of public reason, as are religious objections asserting that genetic modification is objectionable because it amounts to playing God. Yet, the view does not immediately imply that a restrictive legislation and governance of GM is justified. In general, one can propose justifications for coercive legislation that are not shared by everyone. However, one should refrain from proposing coercive legislation that one is convinced cannot win the assent of everyone. Since some citizens accept only secular reasons, all coercive legislation must be justifiable by secular reasons, even if there are also citizens who accept this legislation purely for nonsecular reasons (2009, p. 63). It is clear how this carries over to the case of GMOs. Some citizens do not accept the naturalness objection (or the playing-God objection), which means that a restrictive governance and legislation of GMOs cannot be based solely on those objections; any restrictive legislation must be fully justifiable on nonmetaphysical and nonreligious grounds.

What then about the reverse situation? Suppose that a nonrestrictive legislation of GMOs is acceptable to those who are unmoved by the naturalness objection and the playing-God objection, but is rejected by those who find those objections convincing? Gaus and Vallier note that their view "implies that religious citizens must not have laws imposed upon them which they have no conclusive reason to accept. Even if a secular rationale is necessary in our society for a publicly justified law, it can be defeated by a reasonable religious conviction without any secular backing" (*Ibid*). Again, it is clear how it applies to the present context. Assume that a nonrestrictive governance and legislation of GMOs would be unacceptable to those who endorse the naturalness objection. This opens up the possibility that, on Gaus and Vallier's view, a permissive governance and legislation on GMOs could be rejected on the ground that proponents of the naturalness objection reject it. The basic idea proposed by Gaus and Vallier is that there is a fundamental asymmetry between the justifications needed for accepting a coercive legislation and those needed for rejecting it. One cannot

endorse a coercive legislation while admitting that it can be given only a religious justification. However, one can reject a coercive legislation, even if the rejection can be given only a religious reason, and no secular reason.

While Gaus and Vallier's view, as we have seen, is much more welcoming to reasons such as the naturalness objection and the playing-God objection than Rawls's view, it is still not clear how much support it lends to PPP. The crucial question for Gaus and Vallier will be whether a nonrestrictive governance of GMOs is *coercive* of those who endorse the naturalness objection or the playing-God objection (and perhaps the risk objection) in the sense that a nonrestrictive governance fails to respect their integrity and freedom of conscience. Consider an analogous case, a legislation that permits same-sex marriage by simply failing to prohibit it. This legislation is nonrestrictive in an obvious way. Consider Alf, who is not the least interested in same-sex marriage himself, but who objects to same-sex marriages on religious grounds, or because he views same-sex marriages as highly risky, though this is unsubstantiated by current evidence. Clearly, a nonrestrictive legislation regarding same-sex marriage would affect Alf's life—if the legislation is passed, he will be forced to live in a society where same-sex marriage is legally recognized, or emigrate to another country. However, can this legislation be considered coercive towards Alf in a way that defeats its justification as it fails to respect Alf's integrity and freedom of conscience?

Returning to the GMO case, the crucial question that we must answer in order to determine whether the naturalness objection is sufficient to block permissive GMO legislation is thus the following: Are permissive policies concerning GMOs coercive towards those who hold the naturalness objection? This question—of whether a nonrestrictive governance of GM is unduly disrespectful of some citizens—is orthogonal to the question of whether PPP is a good idea or not, and to any outcome that processes licensed under PPP may have. This renders special measures like PPP less relevant for determining the legitimacy (or contributing to the legitimacy) of policies.[11]

Note that among their many interesting observations, Gaus and Vallier point out that the justification of any policy one might propose depends on the reasons that other citizens have. However, "we do not know what reasons others have in large and complex societies. We have to discover what reasons people have" (p. 67). So to enable us to consider what coercive legislation is justified, we need institutions that broadcast the views of individuals for everyone to hear. Of course, central parts of public debate and the political system serve just that function. One can imagine that designated processes licensed under PPP could be seen as an important part of the set of institutions that serve to make publicly accessible what reasons for or against certain policy proposals individuals have. But note two things: First, this justification of PPP does not directly speak to the legitimizing function of processes licensed under PPP, but rather to their epistemic merits; basically, the processes serve to clarify what objections to GMOs exist in a polity. Second, given this rationale for PPP, such processes would make the most sense if we did not already know what objections there are, of if we had no other better way of finding this out.

4.4. Procedural views on democratic legitimacy

The views of legitimacy discussed so far have assumed that legitimacy can be defined in terms of what affected parties would accept, given certain levels of idealization, or given a more or less restricted set of public reasons they could appeal to. We have argued that none of these theories clearly supports PPP. However, an important strand of theories of democratic legitimacy is proceduralist, holding that democratically legitimate policies are those that are adopted by the right kind of decision procedures. This typically means some form of public deliberation followed by a majoritarian voting procedure, where this may include provisions about fair and free elections and reasonably equal access to the policy-making process by different interest groups, and so on (see Peter, 2008).

As may be familiar, some proceduralist theories are *purely* procedural, in that they deny that there is any procedure-independent criterion of legitimacy. The democratically legitimate (or correct) outcome is simply defined in terms of wherever the right procedure takes us. Other theories deny the assumption that there is no procedure-independent criterion of rightness, and advocate for proceduralism on partly epistemic grounds: impure procedural theories insist that there is a right outcome, and that deliberation and other democratic processes are our preferred means for tracking it (Estlund 2008). A combined theory argues that we don't avail ourselves of views about the right outcome, but we nonetheless impose epistemic constraints on what counts as the proper procedure (Peter, 2009).

Advocates of both pure and impure proceduralist views typically impose some requirement of epistemic competence of deliberators and impose epistemic constraints on what counts as the proper procedure. Deliberators need to take facts and reasons seriously (or act as if they do), and need to adjust their views accordingly. Views that blatantly ignore facts, are deeply incoherent, or are maintained in the face of contravening evidence and argument would, it is hoped, tend to be ignored by other deliberators and therefore not have much weight in the procedure. But such views should in any case in principle be disqualified from the deliberative procedure, according to most proceduralist views.

Would PPP be supported by proceduralist views of democratic legitimacy? On the one hand, it would seem that appropriately defined public participation could be part of the procedure that produces legitimacy, though it would of course be implausible to give too much weight to what goes on in such a participatory forum, and even less plausible to give such forums direct legislative power. On the other hand, proceduralism does not support the idea that public participation of the sort licensed under PPP—a procedure that goes beyond ordinary processes of democratic deliberation and legislation—would be a *necessary* additional legitimacy-conferring activity in the case of GMOs. There seems no reason why a proceduralist view could not say that legislation and governance of GMOs could be fully democratically legitimate merely by being the outcome

of the ordinary deliberative procedures. At any rate, a further argument is needed to show why legitimate decision making in the case of GMOs—and with regards to controversial science and technology more generally—requires direct public participation when (if) legitimate decision making concerning other controversial issues, such as tax or educational policy, do not.[12]

Moreover, certain features of procedural theories of legitimacy may be in tension with how PPP has often been implemented. Processes proposed under PPP carry the risk of employing an arbitrary or biased selection of a small number of participants, who are not elected in a fair process, and who do not represent interests or views in the political constituency in a systematic way. So, a PPP justified on proceduralist grounds must include a requirement that certain selection procedures be implemented—procedures that may be very different from what has characterized the kinds of mechanisms for participation that have been implemented.[13]

There is another proceduralist defense of PPP that appears much more plausible. This is the suggestion that PPP is warranted as a remedy for imperfections in the processes of public deliberation or democratic decision making. The idea is that what justifies PPP would be the fact that public deliberation or other parts of democratic decision making have somehow gone wrong it the case of GMOs, and that the remedy needed is the special processes devised under the PPP, such as consensus conferences or citizen hearings. Likewise, sociological surveys of the nature of skeptical public opinion may provide a necessary input to legitimate political decision making on the assumption that these views have somehow been suppressed, or insufficiently represented or efficacious in the democratic processes.

To assess this option, consider first the ways in which a deliberative process in a polity can be imperfect or distorted. There seem to be four (somewhat overlapping) general ways. First, certain individuals or groups may be excluded from participating—say, because they are denied the possibility of speaking, or because they have a more costly or difficult access to the venues where public deliberation occurs. Second, a deliberative process may be distorted if it excludes certain otherwise legitimate views from being expressed. This can happen, for example, if mainstream media are reluctant to report these views, or if powerful organizations and political parties are unwilling to represent them. A third way concerns the effects of admitting illegitimate views that deny basic liberal rights or equal standing of other citizens, such as racist or misogynist views, in the process of deliberation. Admitting such views in public deliberation may have chilling effects, making democratic participation more difficult for those who are targeted. Moreover, debating and contravening illegitimate views may divert attention from the real issues, and the representation of illegitimate views may have a distorting effect on what participants consider as reasonable political compromises (e.g., the presence of illegitimate hateful xenophobic rhetoric in the public debate may make us willing to accept compromises in our policies regarding refugees and migrants that we would otherwise not accept). Fourth,

democratic deliberation may be skewed or distorted when participants simply fail to respond rationally to evidence and arguments that are available or that are provided by other participants.

These all represent familiar and potentially serious ways in which public deliberation may be defective or may need amendment or corrective measures. As we said, one might try to defend PPP by appealing to one or more of these defects of deliberative processes, or other similar defects. It is far from obvious, however, that this can succeed in the case of GMOs. It is not credible that European debates over GMOs have been affected to a significant extent by any of the above. No one has been excluded from voicing his or her view about GMOs. No legitimate view about GMOs has been excluded, and this is true also of views critical of GMOs. It might certainly be true that mainstream scientific organizations of various sorts, including government organizations, have been unwilling to accept and propagate GMO-critical views. However, many other organizations, including the mainstream media, have provided ample space for these views.

Perhaps proponents of the naturalness objection (and its theological cousin, the playing-God argument) have felt that others were trying to exclude their arguments from serious consideration. Certainly, the naturalness argument has been met with resistance in academia and, one can imagine, in public debate as well. However, there is a charitable interpretation of such aversion to the naturalness objection. Those rejecting the naturalness objection can (and should) generally recognize that people are fully entitled to hold the view that GMOs are unnatural and therefore morally problematic, and to express that view in public. However, if one accepts a Rawlsian view on public reason, one can nonetheless insist that the naturalness objection is not suitable for justifying public policies, and that it should therefore be bracketed in those specific contexts. Moreover, even if one accepts that the naturalness objection is an eligible view, one can still object to it as incoherent and therefore as not rationally convincing, as we mentioned above. There is a difference between excluding a view or refusing to take it seriously, on the one hand, and not being rationally convinced by it, on the other. GMO skepticism and the grounds upon which it is based have been voiced and heard, but not everyone has been convinced. If anything, GMO skeptics could be blamed for having failed to respond rationally to evidence about the safety of GMOs. This could be considered a failure of the democratic deliberative process (and many do consider it as such), but it was not the one that proponents of PPP had in mind for correction. In conclusion, we suggest that PPP, as we perceive it, cannot be defended as a measure needed for correcting a failure of deliberative processes in the case of GMOs.

5. CONCLUDING REMARKS AND FURTHER REFLECTIONS

PPP endorses the uses of designated participatory procedures as a response to widespread GMO skepticism among citizens. However sympathetic this idea is, we have presented a challenge to it: it seems that the most influential and commonly discussed theories of democratic legitimacy do not support PPP in the

case of the GMO controversy. Designated public-participation processes about controversial issues might, in some instances, even be in tension with tenets of liberal democracy by violating restrictions on public reason, or by suggesting that coercive legislation limiting the use of GMOs can be publicly justified when it cannot. In some cases, such processes may effectively give certain views too much space and influence, thereby arguably detracting from the overall legitimacy of the democratic processes. We mentioned rationales for PPP that go beyond those having to do with democratic legitimacy. Two other general aims that could be furthered by designated public-participation processes are worth considering: first, the aim of increasing public support or acceptance of public policy and governance of controversial science and, second, the aim of providing an epistemically more qualified view of possible harms and benefits. The extent to which designated public-participation processes further these aims is, of course, variable. If what we have argued is correct, there might be a price to pay for invoking such processes, in the form of decreased democratic legitimacy, but there is no general answer to the question of whether these other benefits of such processes may be worth the price.

NOTES

[1] Inevitably, some disagree that the absence of evidence for adverse effects warrants the claim that GMOs do not have such effects. Critics typically argue that we cannot conclude that GMOs do not have harmful effects based on the fact that no evidence of such effects has been found, given the scope of and methods employed in the studies that have as yet been carried out (see, e.g., Hilbeck et al., 2015).

[2] In the study cited, the only proxy for knowledge is bare *awareness of* GMOs—i.e., an affirmative answer to the question "Have you ever heard of genetically modified (or GM) foods before?" (Eurobarometer, 2010, p. 13, n. 13). Such awareness is correlated with answers to questions concerning the benefits, risk, naturalness etc. of GMOs that are negative towards them (e.g., an affirmative answer to the question "GM food is not good for you and your familiy").

[3] There are likely other contributing causes of this lack of a clear and precise defence of PPP. First, many proponents of PPP are found among social scientists and administrative officials, and the cultures of these fields often include a substantial aversion to overtly normative argumentation. Second, the fact that that proponents typically conceive of themselves as doing empirical research gives rise to a tendency to frame PPP as a historical fact that is a consequence of how modern societies are structured. And third, it seems to be an unquestioned assumption among many writing on public participation (as it is in society generally) that democratic values require as much direct public involvement as possible—i.e., that PPP is 'more democratic' than alternative procedures.

[4] This section borrows from Kappel, 2017. See this paper for a further elaboration of the concept of legitimacy and how it relates to fact-dependent policy disagreements.

[5] Note that Rawls (2001, p. 91) acknowledges that many 'ordinary' political issues touch upon constitutional essentials and basic justice, including "policies to protect the environment and control pollution." However, he suggests that "the restrictions imposed by public reason do not apply to them, or if they do, at least not in the same way or so stringently." It is also worth noting that Rawls is in some places open to the possibility that issues not pertaining to constitutional essentials or basic justice should ideally be decided on the basis of public reasons. Thus he writes (1993, p. 215): "Some will ask: why not say that all questions in regard to which citizens exercise their final and coercive power over one another are subject to public reason? Why would it ever be admissible to go outside the range of public reasons? To answer: my aim is to consider first the strongest case where the political questions concern the most fundamental matters. If we should not honor the limits of public reason here, it would seem we need not honor them anywhere. Should they hold here, we can then proceed to other cases. Still, I grant that it is usually highly desirable to settle political questions by invoking the values of public reason. Yet this may not always be so."

[6] Connoisseurs of Rawls's writings may object that the requirement that policies be justified only by public reasons does not apply to ordinary citizens in ordinary public debate. However, the public-reason requirement *does* apply to ordinary citizens when they are engaged in political acts such as voting (Rawls 1997, p. 769). To the extent that consensus conferences are to have some weight in legislation, it is plausible to see citizens participating in them as engaged in such a political act, and thus under a duty to offer public reasons. Furthermore, while nonpublic reasons may be offered in ordinary public debate, this is only with the proviso that public reasons are presented "in due course"—at least before any legislation is enacted (Lafont 2007, p. 240; Rawls 1997, p. 784). So even if consensus conferences were seen as just another part of the ordinary public debate, public reasons for any policies recommended would still need to be given before they become law.

[7] One should be careful, however, about how one interprets the words 'safe' and 'risky.' As we understand these terms, they mean this: GMOs are safe iff it is known (or well established) that they are highly likely not to have any adverse effects on human health or the environment. They are risky iff it is known (or well established) that they are likely to have such adverse

effects. These two concepts thus do not exhaust the possible epistemic situations we can find ourselves in. In particular, we may face large *uncertainty* about the potential effects of GMOs—i.e., it might not be known (or well established) whether GMOs are likely to have adverse effects or not. This would seem to be the only legitimate factual basis for GMO policy on the broader interpretation of Rawls. But note that the view that we do not know that GMOs are unlikely to have adverse effects may be what some have in mind when they say that GM crops are risky (or at least that they are not safe). For a discussion of the relations between the concepts of safety, risk, and uncertainty, see Möller, Hansson & Peterson (2006).

[8] Streiffer and Hedemann advance their argument via an interpretation of the requirement that public justification must be neutral in certain respects. This detail does not affect the overall argument; the crucial question is what is, and what is not, included in public reason.

[9] Streiffer and Hedemann deny that the naturalness objection and the similar playing-God objection can be excluded from public reasons. They also argue that we should reject what they call the Requirement of Soundness (it is legitimate to dismiss an intrinsic objection on the grounds that it is unsound) (2005, p. 201), the Requirement of Secularity (religious views have no legitimate role in arguments about public policy) (p. 203), and the Requirement of Reason (it is legitimate to reject an intrinsic objection on the grounds that it is inchoate) (p. 204). Their basic argument for rejecting these further requirements is that reasonable comprehensive views can include views that do not meet the requirements. Consequently, premise (2) of their argument cannot be shown to be false with respect to the intrinsic objections by showing that those objections fail to meet one or more of the three requirements.

[10] Thus, an alternative way of framing the difference between Rawlsian theories and Gaus and Vallier's theory is in terms of what reasonable citizens must agree about. On Rawls's view, we must all agree on the *reasons* that are used to justify policies (but it is not a requirement that everyone, from within their comprehensive view, accept a policy if it is justified by public reasons only). On Gaus and Vallier's view, we must agree on the *coercive legislation* (but it is not a requirement that we all agree on what set of reasons justifies that piece of legislation). For an elaboration of the difference between the "reasons-for-decisions model" and the "coercion model" of public justification, see Lister (2013, esp. Ch. 1).

[11] It is worth noting that the asymmetry between accepting and rejecting coercive policies—which is an implication of the presumption of liberty—leads Gaus and Vallier's view towards fairly strong limits on state action: in Gaus's words, the theory has a "classical liberal tilt." Thus, a likely consequence of accepting this theory would be that development and marketing of GMOs by *private* actors would be allowed (at least insofar as such products do not present risks), while publicly funded research, relying on taxation and therefore coercion, would not be legitimate. Or in other words, Monsanto would be free to market "Round Up Ready" corn and soy, but governments would not be allowed to subsidize the development of crops such as vitamin-A-enriched "Golden Rice" that are intended to solve nutritional and other problems in the poorest parts of the world (and would perhaps not, therefore, be viable on market terms). This, we believe, is not the outcome most PPP advocates were expecting.

[12] Our argument against the view that PPP is justified by proceduralist theories of legitimacy is, in this sense, conditional: if the relevant proceduralist account requires direct public participation *generally* then of course such a conception of legitimacy supports direct public participation in the case of science and technology policy as well.

[13] This argument does not, of course, tell against participatory mechanisms that seek to mitigate these problems (see, e.g., Lafont, 2015).

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