



HAL
open science

Ideology, engine or regime. Styles of critique and theories of innovation.

Brice Laurent

► **To cite this version:**

Brice Laurent. Ideology, engine or regime. Styles of critique and theories of innovation.. Benoît Godin, Gérald Gaglio, Dominique Vinck. Handbook on Alternative Theories of Innovation 2021, Edward Elgar, pp.369-386, 2021. hal-03442298

HAL Id: hal-03442298

<https://minesparis-psl.hal.science/hal-03442298>

Submitted on 23 Nov 2021

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

CHAPTER TWENTY ONE

Ideology, engine or regime. Styles of critique and theories of innovation

Brice Laurent

Introduction

The pervasiveness of innovation in the contemporary public discourse manifests itself in the omnipresence of figures like the “start-up creator”, the “entrepreneur”, or the “investor” in current economic and political debates. But the inevitability of innovation is more and more accompanied by a distinctive atmosphere of skepticism regarding its benefits, and the worldview it encompasses. As the influence of the “tech sector” grows larger, global companies such as Google, Facebook or Amazon are both heralded as seemingly never-ended sources of innovation, and regularly criticized for the ever-growing extension of their power, their disregard of public concerns such as data privacy and the social environment they promote on their grounds. The start-up culture at the heart of current innovation discourses is targeted by journalists, professionals and academics worried about the “collateral damage”, as a *Guardian* journalist put it, of disruptive innovation.¹ Eventually, the technological developments on which so many contemporary innovations rely, in fields as diverse as artificial intelligence, renewable energy, or urban mobility, are themselves criticized for their ecological costs and their potential negative consequences in terms of labor structure or social justice.

Scholars, activists and politicians have proposed critical evaluations of the current state of innovation. These critical movements have become integral to the current debates about the objectives and practices of innovation, to the point that they can be said to contribute to the dynamics of innovation itself. “New business models”, “inclusive innovation practices” or “new modes of thinking” are presented as answers to the perceived shortcomings of the current innovation environment. Like capitalism, innovation is prone to integrate its own critique to re-invent itself and further extend the perimeter of its actions (Boltanski and Chiapello 2005).

This chapter focuses on the relationships between innovation and critique. A way of analyzing these relationships would be to settle on a specific definition of “innovation”, and then examine how it is critiqued and by whom. Another one would be to examine several groups of critics, from anti-technology neo-Luddite movements (Jones 2006) or anti-globalization organizations, to theorists of alternative approaches to innovation (see Godin and Vinck 2017; and chapters 6 to 14 in this book), and discuss how each of them frames the issues that innovation raises. In this chapter, I adopt a perspective that seeks to bring these two approaches together. I contend that producing a critique of innovation is always based on an understanding of what innovation is, and how it should be studied. In other terms, there is no critique of innovation without a theory of innovation, be it explicit or not. Accordingly, I want to understand how different styles of critique and different theories of innovation are formulated at the same time. Thus, I start not by defining what innovation is and what it is not, what is “mainstream” or “dominant” and what is “alternative”, but by identifying styles of critical approaches to innovation and discussing the (more or less implicit) theories of

¹. <https://www.theguardian.com/commentisfree/2017/jun/08/uber-embodies-the-toxicity-of-start-up-culture>.

innovation that these styles of critique propose. An important point to note in these explorations is that this chapter does not restrict who the critics of innovation are. Some of them are scholars, writing in academic or non-academic publications. Others are practitioners of innovation. Yet others are activists and members of social movements. This means that one should clearly identify the identity of the critics, and not take the standpoint of academic critics for granted.

In the following, I start by examining a contemporary style of critique that adopts the religious vocabulary, as it targets the “myths” or the “religion” of innovation. This style of critique sees innovation as an ideology, and contrasts this ideology with facts. I then turn to another style of critique associated with another theory of innovation, which originates from the works of Michel Callon. This approach sees innovation as an engine for critique, and situates the critical position in the midst of innovation processes. The last section examines a third style of critique, which grounds the critique of innovation from an analytical distance from which innovation can be theorized as a situated regime.

The critique of a religion of innovation

Contesting myths

A frequent style of critique uses a religious vocabulary to characterize innovation. It is present in the academic literature, but also, and perhaps mostly, in the specialized press and the overall public sphere. Writing in the *New Yorker* in 2014, historian Jill Lepore spoke of the “gospel of innovation” to tell the story of “disruptive innovation” and how it quickly spread in spite of flimsy empirical evidence (Lepore 2014). In 2017, political scientist and STS scholar Langdon Winner wrote on his website about “the cult of innovation, its colorful myths and rituals”, and claimed that innovation was “today’s central ‘god term’”, which “has begun to resemble a cult with ecstatic expectations, unquestioning loyalty, rites of veneration, and widely echoing exhortations of groupthink”. These academics are joined by a growing number of journalists and public intellectuals who also describe innovation in religious terms. Some speak of “the orthodoxy of unorthodoxy” to describe the unquestioned belief that innovation is the ends and means of all human endeavors (Leary 2018). Already in 1999, the *Economist* published an article entitled “Industry gets Religion”, in which “the rhetoric of innovation” was described as “a new theology”, and the *MIT Technology Review* talked about the “religion of innovation” in 2013.² The history of innovation shows that “innovation” was initially a term that designated a risky, if not utterly dangerous tendency to question the established order of things in the context of institutional religions (Godin 2015, 2019). The current critique of innovation as religion displaces this original trope, as it describes innovation as a new obligatory path for salvation, whether individual or collective. “Salvation”, here, has both economic and social undertones, as innovation is expected to both be an engine for economic growth and a source of workable answers to pressing social problems.

The vocabulary of religion can be seen as a convenient figure of speech, which provides telling metaphors and powerful illustrations of what critics of innovation aim to convey. That these metaphors flourish in magazines and blogs is a sign of the appeal of this register and its easy use in public debates. But the vocabulary of religion is also the characteristic of a style of critique that is associated with a particular understanding of what “innovation” is, and why it deserves critical attention. “Innovation”, here, designates a mode of action that is based on descriptive and analytical elements, which serve as the basis for

². *MIT Technology Review*, March 18, 2013.

prescriptions. “Critique”, then, is about the demonstration that the descriptive and analytical elements are mistaken. It is an epistemic critique, that of an “innovation-speak”³ that functions as a dominant public discourse aiming to provide diagnoses and corresponding solutions. The use of the religious vocabulary by innovation critics is then associated with an approach seeking to “debunk” what is presented as a fact, yet is nothing more than poorly ground belief. As modernist critics of religion sought to confront religious dogma with the reality of historical facts (Poulat 1962), these critics target innovation as an ideology, and contrast it with a discourse meant to be based on facts.

When Jill Lepore speaks about the “gospel of disruption”, she targets management scholar Clayton Christiansen and his theory of “disruptive innovation”, which is based on empirical examples, and leads into prescriptions for companies to use. Lepore shows that the empirical elements that Christiansen used can easily be contested, which weakens the whole theory he has been defending, and turns it into nothing more than an ideology. The critique contrasting ideology with facts is also visible each time the language of the “myths” of innovation is used, in which case the target is not an individual author or a definite theory (as Christiansen’s disruptive innovation), but tacit hypothesis of current innovation discourses. The references to these “myths” are numerous in the academic and non-academic⁴ literature. For instance, Mariana Mazzucato argues in *The entrepreneurial state: Debunking public v. private sector myths* that the role of the state is crucial in economic dynamic, whereas the discourse of innovation often makes free markets and the unconstrained interventions of entrepreneurs the sole source of innovation (Mazzucato 2015). She can then argue that if there is a US model and if it is to be replicated, then all its components ought to be included in it. In the online piece I quoted above, Langdon Winner identifies a persistence of a certain technological determinism, which has been contested in a rich body of scholarly work. Pierre-Benoît Joly (2017) discusses the pervasiveness of the linear model, which describes innovation processes in successive phases, in spite of numerous theoretical works and innovation projects that have challenged this model.

Challenging the ideology of innovation

The language of the innovation “myths” points to a critical position that consists in uncovering a discourse by challenging the truth-value of the claims it is implicitly or explicitly based upon. This type of critique can be identified beyond the use of the religious vocabulary, each time scholars or practitioners characterize an overly simple, yet dominant version of innovation that ignores more sophisticated analysis and practices. In a recent volume, Benoît Godin and Dominique Vinck describe an “ideology” that sees innovation as “good a priori” and equates it with a simple vision of radical technological change for market purposes (Godin and Vinck 2017). This simple version of innovation sees it as the articulation between a dynamic of technological change connected to market extension, performed by particularly bright entrepreneurs, for outcomes that are seen as unquestionably positive. This simple version can then be the target of a critique that contests the robustness of the narrative it proposes.

One can track back the challenges to this simple version of innovation to earlier scholarly discussions about the selective gaze that innovation (usually seen as the mechanical effect of radical technological change) pre-supposes. Consider for instance historian David

³. The expression is used by Russel and Vinsel (2019).

⁴. See for instance ‘The myths of innovation’ in the *MIT Sloan management review* (<https://sloanreview.mit.edu/article/the-5-myths-of-innovation/>); or the critique of the ‘myths’ in order to reveal to true nature of innovation processes by popular authors (e.g. Berkun, 2010).

Edgerton's critique of the scholarly focus on innovation. Edgerton speaks of the ways in which "technological futurism has affected our historiography", by which he means that historians and scholars of technology tend to "reproduce the innovation orientation, both in the choice of innovation as subject matter, and in confusing the innovation with the technology-in-use" (Edgerton 1999, p. 128). For Edgerton, innovation implies an empirical and theoretical focus that is simply too selective, as it ignores the reality of technology as it is designed, practiced, and maintained. In the wake of Edgerton's piece, maintenance studies have insisted that the mundane functioning of "technologies in use" is as interesting (if not more) than innovation for anyone wishing to understand technology and its impacts in human lives. This body of work shows that the actual work of scientists and engineers has often little to do with the tenets of innovation-speak (Russel and Vinsel 2019). This set of works is particularly interesting for our reflection on the nature of critique, because it connects an objective of debunking the ideology of innovation using the truth of (social) scientific facts with the problem of exclusion, of individuals and public concerns. The occultation of maintenance has indeed consequences, in terms of public policy priorities, industrial strategy and allocation of costs and benefits in the functioning of technical systems, including at the level of workers' rights.

Thus, the case of maintenance is useful to illustrate a variation on the critique of the ideology of innovation, which contests not only the epistemic quality of the hypothesis on which it is based, but also their consequences in terms of who is included and who is excluded, what is taken into account and what is not. One can connect this perspective to a range of studies that show that who can act as innovators and be recognized as one is deeply skewed in favor of certain people, often at the expense of women and people of color (Cook 2019). Exclusion effects also manifest themselves when considering the "unintended consequences" of innovation, in domains as diverse as digital technologies (Matsumoto and Kawajiri 2012) or the financial sector (Sveiby et al. 2012; see also Sveiby 2017), which are obscured when the discourse of innovation unproblematically hypothesizes that "innovation is always good" (Soete 2013; Sveiby et al. 2012).

The religion of innovation and its reforms

Phrasing the critique of innovation as a challenge of a quasi-religious discourse is often accompanied by calls for reform. When the *MIT Technology Review* targeted the "religion of innovation", it also had "enough with innovation for innovation's sake" and advised companies to "double down investment in what already works, and take the time to carefully consider new releases".⁵ Godin and Vinck complement their critique of the ideology of innovation with a plea for considering "processes like adaptation, withdrawal, learning from failure, alteration of the innovation and unintended consequences (...) as forms of innovation" (Godin and Vinck 2017, p. 3). The critique of the ideology of innovation often fuels, as much as it fueled by more sophisticated accounts of innovation.

Thus, the reflection about exclusion effects in a version of innovation seen as simultaneously dominant and over-simplifying leads us to consider the possibility of considering alternatives, or, in Joly's terms, of "re-imagining innovation" (Joly 2019). This is precisely what Godin and Vinck ask for as they call for a new research program able to re-open what innovation is about, by including studies of processes that slow down change rather than accelerate it, practices of maintenance or repair, and unintended or unforeseen effects of innovation.

⁵. *MIT Technology Review*, March 18, 2013.

Similarly, practitioners of innovation and innovation scholars often associate the critique of innovation-as-ideology with propositions for reform. They engage in the evaluation of the truth-claims of innovation models and theories, while seeking to refine them. Thus, works in innovation studies have discussed approaches to innovation that are deemed “alternatives”, and which the chapters of this volume provide numerous illustration of. After von Hippel’s seminal book, numerous works on innovation have discussed the attempts at “democratizing” innovation by opening it up to wider groups of people (von Hippel 2004; Stirling 2008, 2014; see: Hyysalo et al. 2016; Oudshoorn and Pinch 2003). The recent interest for “responsible innovation”, which accompanies evolutions in science policy circles, mostly in Europe, can also be interpreted as an alternative approach to innovation, which seeks to integrate into the innovation process the anticipations about potential future effects and possibly affected social groups (Stilgoe et al. 2013). The promoters of these approaches often see them as answers to the shortcomings of mainstream innovation theories and practices. They can be situated within an academic field, innovation studies, which is made of a core dominated by economists, and peripheral approaches that do not always coalesce (Fagerberg and Verspagen 2009; Joly 2017, 2019; Martin 2012), and which often see potential paths for reinvention (Martin 2016). These alternatives have consequences in the policy world, as public institutions embrace calls for “open”, “democratic” or “responsible” innovation (see for European examples: Ernst & Young and CEPS 2011).

Reforms and critique

These considerations bring us back to the notion of critique. While the critique of the “religion” or the “myths” targets an overly simple discourse that misrepresents the reality of innovation processes and does not question the means and ends of innovation, the numerous approaches presented as alternatives show that this critique can stem from the actors of innovation and/or can be integrated in their theories or practices. This is an impetus for further critical works that adopt a similar style as that of the “myths” of innovation, as their purpose is to uncover the extent to which the self-proclaimed alternatives question the basic tenants of the dominant version of innovation. For instance, Joly identifies the persistence of the linear model behind alternatives models of innovation (Joly 2017), Edquist laments that “linearity still prevails” (Edquist 2014), and critics of the European program of “responsible research and innovation” question the eventual effects on the structural dominance of competitiveness objectives (de Saille 2015). These accounts can be read as further attempts at displaying a kind of “bluff” (Ellul 1988), whereby innovation would only pretend to be reformed. But these works can also lead to further reforms of innovation.

One could then try to differentiate between authors according to the degree to which they are “reformists”, possibly in relation to their proximity with the actors of innovation in public bodies or private companies. One could possibly isolate “critics” from “reformers”, the former being more interested in challenging the current state of affairs and the latter more concerned with integrating alternative approaches from within. Such an attempt at sorting out reformers and critics is the approach undertaken in a recent collective volume that discusses the various processes through which innovators are actively made (Wisnioski et al. 2019). While there is a clear value in this distinction, it is also striking that the boundary that separates those groups is not always clear. Being a critic of innovation by pointing to its exclusion effects on people leads to calls to integrate these people as potential innovators (Cook 2019). In turn, self-proclaimed “reformists” seeking to include more women and people of color in innovation are also critics of current innovation discourses and practices (Sanders and Ashcraft 2019). Pointing to the need to making maintainers might lead others to rethink what it means to be an innovator, for example by introducing an “ethics of care” in the

formal training of scientists and engineers (Russel and Vinsel 2019). The porosity of the line between critique and reform is at the heart of the style of critique of innovation that questions the ideology of innovation. One conclusion this can lead to is that this critique is meant to be continuously exercised: as proponents of innovation might be convinced that the simple version relies on myths, one should then question the calls for “democratization”, “openness” or “responsibility” and confront them with the reality of innovation practices. This is of course a continuation of a critique meant as an exercise in truth telling. But it also means that one delves ever further into innovation processes, and ultimately participates in refining them.

At this point, one can reflect on the consequences to the problem of critique. If there is a tendency of innovation theory and practice to absorb its own critique (maybe as capitalism itself, see Boltanski and Chiapello 2005)), then one can situate the critical activity at the core of innovation processes themselves. This would require elaborating another theory of innovation, as I will discuss in section 2 of this chapter. But one can also envision grounding critique on another type of analytical distance from innovation, then seen as a vehicle for wider transformations. I will discuss this latter approach in section 3 of this chapter.

Can innovation be an engine for critique?

Innovation as a productive source of exclusion

The critique of innovation that I discussed in the previous section constitutes an object of inquiry, “innovation”, and evaluates it, possibly before proposing to reform it. But innovation, whether described or practiced, be it “dominant” or “alternative”, always has a critical ambition, if only because it is connected to an idea of novelty expected to have an impact, however limited, in the real world. Historical works show that the early use of the term “innovation” pointed to the negative effect of an operation contesting the stability of the collective order (Godin 2015, 2019). This is at the core of Schumpeter’s perspective on innovation. Schumpeter makes innovation a central component, if not the main engine, of capitalism. The famous notion of “creative destruction” that he introduced has entered the common vocabulary of innovation scholars, often in a way that directly echoes the idea of “disruption”, as a dynamic that reshapes existing orders of things, with unavoidable and potentially negative side effects. But the critical part of creative destruction in Schumpeter’s approach to innovation and capitalism is not limited to the regrettable side effects in terms of bankrupting established companies or bringing workers out of their jobs. For Schumpeter, creative destruction is at the core of capitalism, but also plants the seeds for the destruction of capitalism. This is connected to the very success of capitalism, and not, as in Marx’s works, because of capitalism inherent contradictions and inevitable instabilities in terms of class relationships. For Schumpeter, innovation requires a permanent flow of radical ideas, which the logic of capitalist growth threatens, as innovation risks “being reduced to routine” (Schumpeter 2003 [1943], p. 132).

Schumpeter’s theory of innovation is an invitation to explore at greater length the kind of critique that can be associated with a dynamic theory of innovation. Here, “critical” refers to the ability of innovation to contest existing orders of things. How to theorize this critical ambition? Is it possible to associate it with a theory of innovation, in that it would provide analytical tool to explore the dynamic of innovation and its social consequences? Exploring these questions will force us to discuss what “critique” is about, asking questions such as: what objectives and practices of critical activity? Who conducts it? For the benefit of whom? To discuss these questions, I turn to a theory of innovation originating from Actor-Network Theory (ANT), and particularly the works of Michel Callon. This stream of work has barely

been associated to the idea of critique, yet, I will argue, is as much a critical theory as it is a theory of innovation.

Michel Callon is primarily known for his contribution to Science and Technology Studies (STS) in general and ANT in particular. Callon has written extensively about public controversies, democratic practices and lay knowledge, and the making of markets. These threads of analytical works ought to be seen in conjunction with each other. What brings them together is a theory of innovation that focuses on the joint making of technological, economic and social change. In Callon's work, innovation is a dynamic that produces technical and social realities, that re-arranges connections between humans and non-humans, and re-defines them in the process. Callon's theory of innovation is connected to a reflection on markets – not as a ready-made sphere of social activity, but as entities that need to be actively constructed. The dynamic of market construction in Callon's accounts is directly connected to inclusion and exclusion mechanisms, which encompass what economists call “internalization” and “externalization”. Markets rely on “framing” processes, which result in the construction of boundaries: between what is integrated in the calculation of costs and prices by buyers and sellers, between who is involved in market exchanges and who is not. But framing is not the end of the story of market evolution. Framing necessarily results in exclusion mechanisms, as potential consequences are not taken into account in the calculation of costs, certain actors are not included in the economic reasoning. For instance, workers hoping to benefit from social welfare will be excluded when markets start to “favor flexibility and mobility” (Callon 2007, p. 156). In Callon's approach, these exclusion effects are the consequences and sources of innovation.

This idea of exclusion is only rarely associated with Callon's works. Yet it is directly present, including in his works that have been read as a plea for deliberative democracy. *Acting in an uncertain world*, which he co-wrote with Pierre Lascoumes and Yannick Barthe (Callon et al. 2009), has been commented in those terms (Pestre 2008; Fuller 2010). Yet all the examples that are analyzed in this book relate to cases of suffering and violence, be they those of patients suffering from rare diseases not taken into account in drug development in pharmaceutical companies, or those of social movements mounting violent opposition against nuclear waste retreatment projects that threaten to forever change the nature of the territory where they live (see also Barthe 2006; Callon and Rabeharisoa 2008). These exclusion effects are important in Callon's theory of innovation, because they are productive. Callon speaks of the “proliferation of the social” in relation to market development, to point to the emergence of social groups engaged in scientific and social inquiries because of the exclusion effects they suffer from. The terms “emergent concerned groups” designate the collectives engaged in these inquiries. Callon describes them in those terms:

Faced with such difficulties and uncertainties, emergent concerned groups become engaged in investigations and inquiries that sometimes lead them to invest in full-blown research and innovation. They then contribute to the constitution and organization of research collectives, mobilizing not only members of the group but also a wide range of professionals, including researchers and experts. (Callon 2007, p. 146)

Thus, concerned groups are active producers of knowledge. They are innovators themselves in that they propose new arrangements for the production of knowledge and the organization of markets and the political. For instance, patient groups intervene in the production of knowledge and become political actors in doing so (Epstein 1996; Callon and Rabeharisoa 2008). Opponents to nuclear waste disposal projects have forced to re-

problematize the issue of nuclear waste in the terms of the reversibility of technical choices (Barthe 2006).

From concerns to critique

The notion of “concern” in the Callonian theory of innovation stems from political theory as much as the sociology of market. It has roots in the American pragmatist tradition, particularly Dewey’s theory of the public as exposed in *The public and its problems* (Dewey 2012; see Marres, 2007). An important element in this theory of the public is that contrary to common interpretations of Dewey’s approach to democratic life, consensus and dialogue are not primary components of what constitutes publics. Instead, publics are affected (and become “concerned groups”, in Callon’s language) when they suffer. This democratic theory is in that sense a theory of innovation, but also a theory that has a certain degree of violence at its core. This is from these hardly felt concerns that the production of knowledge by concerned groups can occur, and that these concerned groups can organize themselves. In other words, what affects publics is the source of both technical and social production. Here, exclusion is also a positive mechanism in so far as it serves as an engine for new social and technical identities to emerge.

Callon’s theory of innovation and its connection with democratic participation have not been unanimously well received. Some have identified a tension between the expression of concerns, often in violent forms, and the expertise in the procedural organization of hybrid fora that some of Callon’s works also suggest (Callon et al. 2009), easily integrated in economic projects and oblivious to structural power relationships (Pestre 2008; Fuller 2010). This invites us to discuss the ways in which way this theory is a critique, and what it is a critique of. First, it is as much a theory of democratization as it is a theory of innovation. Here, innovation is a destabilization of existing political and economic order, and the outcome of the works of concerned groups. A challenge for innovation and democratization is then to help concerned groups to emerge and voice their concerns. As such, innovation is an engine in “the art of not to be governed that way”, to re-use Foucault’s famous characterization of critique (Foucault 1997, p. 45). Second, this theory of innovation is about the making of new political subjects. In that regard, it directly echoes one of the central components of the critical approach as proposed by Michel Foucault and Judith Butler, for whom critique ought to be tied with interrogating oneself as a subject (Butler 2002). The notion of “problematization” is used by these authors in that context. It points to an activity that questions the existing state of affairs and simultaneously questions the identity of the subject in the critical activity (Foucault 1984; see: Laurent 2017; Lemke 2011). It also suggests that the role of the analyst is also to provide resources (if only analytical) to the concerned groups he or she studies, and thereby to participate in the critical activity in which they are engaged (see: Callon 1999 about his own experience with a patient group organization). Third, the critical theory that derives from Callon’s theory of innovation is also related to a collective dimension. “Matters of concern” are politically significant when they are tied to the production of social groups, itself connected to knowledge production (Callon 2007, p. 158; see Latour 2004). This ought to be read as in connection to an understanding of critique that links the production of self and the production of collectives, that ensures “the transition from a fragmentary condition to a collective condition” (Boltanski 2011, p. 42). If we follow Callon’s theory of innovation, this task is never ending, as the dynamic of innovation constantly produces overflowing.

A last (and crucial) element of the style of critique that this theory of innovation proposes is that it is *positive*, in that it is connected to the new realities that are spurred by the

dynamics of innovation. These new realities are not only the outcomes of the concerned groups engaged in inquiries, exploration, and lay research activities, but also that of the analyst herself, as she studies these concerned groups and contributes to make their contribution visible. Thus, this is a critique that “multiplies the signs of existence”, in Foucault’s powerful words (Foucault 1994, pp. 106–7, my translation), alongside what the actors themselves are engaged in.

A dynamic process of critique and integration

Callon’s theory of innovation directs the analytical attention towards the identity of those in charge of innovation. Concerned groups suffer from what is being left out by market dynamics, or from the consequences of what is being done in existing orders of things, and then become innovators themselves in that they re-invent research practices, make new realities emerge, and eventually re-define collective priorities. This process means that “innovation” is both an engine for producing inequalities and suffering, and the activities in which concerned groups engage. In our discussion of Callon’s theory of innovation, innovation has appeared as a continuous process, almost synonymous with market development (and it is in that regard that the proximity with Schumpeter is manifest). Here, “innovation” does not point to the same reality as the entity targeted by the critics of the “myth” that we discussed in the first section of this chapter. For the latter group, innovation is a political and economic program, which is contestable because of its weak intellectual foundations and its social consequences. But the two perspectives should not be seen as two distinct intellectual spheres with no contact with each other. One can theorize the critique of the “myth of innovation” in the terms of framing, overflowing, and concerned groups. The questions to ask are then: who are the groups concerned by the dominant versions of innovation? Who suffers from them? What are the counter-propositions that these concerned groups engage in? What can the analyst do to account for them, and participate in their realization? The case of open source provides an illustration at this point, as it can be as a reaction against a model of innovation that is based on property rights and a strict definition of ownership, or, in other words, has pressing framing effects regarding who can and who cannot engage in software development, and earn money out of it. Christopher Kelty’s account of the free software movement can be read as the story of a concerned group affected by the closure of software by proprietary rights, and regularly questioning its own means of association in the same time as the content of what it is mobilized about (Kelty 2008).

This dynamic is not limited to the world of software. Among other sectors, agriculture has been a domain where open source has received a growing interest (Chance and Meyer 2017). Another illustration is the somewhat loose domain of the “smart city”, where the reference to innovation has been explicitly integrated in urban policies and private companies’ strategies in ways that can be analyzed in the terms of a dynamic of framing and overflowing. The initial smart city discourse made technological development the central element of the transformation of the city. Experiments such as Masdar in the United Arab Emirates or Songdo in South Korea appeared as illustrations of a trend that consisted of creating technologically-optimized cities, usually at the margins of existing metropolis (Evans et al. 2016; Halpern et al 2013). The problematic relations between a technology-centered city and citizens expected to live in it, the ever-increasing role of private companies, and the soulless nature of projects entirely directed towards technical and economic purposes did not go unnoticed, in the academic world as well as for practitioners. Thus, the initial version of the smart city has spurred counter-reactions, including from the cities themselves. A telling example is that of Medellin, where innovation policies have been meant to be inclusive, as an

explicit reaction against a global smart city discourse seen as a threat for the social cohesion of the city (Talvard 2018).

In the previous section, I discussed how the critique of the ideology of innovation led to reforms and spurred a continuation of critical activities related to the actuality of these reforms. The Callonian style of critique implies that the dynamics of framing and overflowing is permanent, yet in this case the critical position is not exterior to innovation but integrated in it. In the Callonian theory of innovation, the critical activities lie in the concerned groups and their interventions. It supposes that concerned groups become themselves innovators, that they participate in yet other processes of framing bound to produce new overflows. It is a positive critique that cannot be separated from the dynamic of innovation itself, and from what the affected actors do about it. It implies forms of intervention from the part of the social scientist that can be described as “interferences” (Law 2010), or “modulation” (Kelty 2008). Is it then possible to envision a critique of innovation that would be extracted from the dynamic of innovation? The next section discusses this point.

A critique of innovation regimes

Situating a regime of intensive innovation

One can situate the configuration within which the dynamics of framing and overflowing takes place. Callon himself situates the “proliferation of the social” associated with the dynamic of framing and overflowing with a particular regime, that of “intensive innovation”. “What is new”, he writes, “is not the fact that markets overflow and therefore produce matters of concern; it is the amplitude and frequency of those overflowings” (Callon 2007, p. 151), which results in “a regime favorable to all kinds of overflowing” (Callon 2007, p. 152). The reasons for this evolution are not presented in systematic ways in Callon’s writing, but he signals the “singularization” of goods and services, made even more manifest by digital technologies (Callon 2012, 2017). Callon is also clear that this “intensive innovation regime” is only one way of problematizing the relationships between market development and social ordering. One can indeed contrast the singularization regime, characterized by a permanent and intense dynamic of framing, overflowing, and the emergence of concerned groups, with other articulations of innovation processes with political and economic ordering.

An example of such alternative articulations is provided by Callon and Vololona Rabeharisoa, as they comment on the case of a man named Gino, who refused to adopt the expected role of the active member of the concerned group (Callon and Rabeharisoa 2004). In spite of suffering from a genetic disease, he did not engage in collective action as the rest of his family. Callon and Rabeharisoa see in Gino not a reluctant member of a concerned group that would conduct its investigations even when including its most passive members, but as the conveyor of another proposition for political subjectivity. For Gino, what matters is not the re-fabrication of the self in relation to a public concerns, and in connection with an active engagement in additional explorations to fight against it. Gino does not engage in the production of knowledge about the disease, nor does he seek to act on it. Rather, he considers that he needs to live with a disease that is part of who he is as a human subject. This suggests that the dynamics of innovation and critique that I described in the previous section mostly through Callon’s works should itself be situated, within a regime of “intensive innovation” that might be contrasted with others.

Innovation regimes

I call “innovation regime”⁶ the stabilized apparatus that associate discourses, practices, regulations, market organizations and social movements in defining the practices and expected objectives of innovation. Innovation regimes are political, economic and social configurations, and the study of these configurations can then provide resources for critique, yet in a different guise than the evaluation of their truth-value (see section 1), or the integration in a permanent dynamic of framing and overflowing (see section 2).

Innovation regimes can be associated with an understanding of innovation as “part of a collectively held imaginary of sociotechnical progress that accompanies a complementary diagnosis of a deficiency in the receiving environment” (Pfotenhauer and Jasanoff 2017, p. 786). In other words, an innovation regime functions within a particular way of defining collective priorities and answering them. It is connected to the organization of public institutions, be they national or international, as they diagnose technological, social or economic deficits that need to be filled thanks to innovation (Pfotenhauer et al. 2019). Understanding the components of innovation regimes also implies that we consider how markets are expected to perform and what their desirable contributions to the common good are. This means that there are close connections between regimes of innovation and the institutions that stabilize them, often through policy instruments (Lascoumes and Le Galès 2007) or market devices (Callon et al. 2007). For instance, the construction, development and extension of instruments such as the linear model of innovation or national innovation systems are tied to international organizations, mostly the OECD (Godin 2006, 2009). A regime of innovation based on “dialogue” and instrumented by various participatory mechanisms emerged in the United Kingdom as a component of Tony Blair’s “third way”, which radically re-worked the role of the state and the understanding of society (Thorpe 2010). The regime of “responsible innovation” in Europe is part of how the European institutions attempt to re-define the terms of their legitimacy by connecting scientific objectives with the perceived priorities of European publics (de Saille 2015; Laurent 2017). In all these examples, regimes of innovation are situated within national or international institutions. Policy programs are crafted in these institutions, and public priorities are defined, and this results in particular understandings of what innovation is, how it should be conducted and for what purpose. In turn, the formulation of innovation also participates in stabilizing the principles according to which public institutions determine what is legitimate and what is not, what is consistent with the common good and what is not.

The analysis of innovation regimes is not only descriptive, but also tied to a style of critique. Critique can originate from adopting the standpoint of a certain regime to displace another one – pretty much as Gino’s passive resistance underlines the fact that being a member of a concerned group can be contrasted with other way of enacting political subjectivity. Critique can also focus on how devices and instruments that are parts of certain regimes of innovation circulate elsewhere. Thus, authors analyze the circulations of formalized innovation policy instruments outside the arenas where they are produced, and explore the consequences of this circulation. For instance, the National Innovation System (NIS) approach travelled to South America with problematic consequences (Delvenne and Thoreau 2012), and the “MIT model” has given rise to significant variations in non-Western political cultures (Pfotenhauer 2019; Pfotenhauer and Jasanoff 2017). This type of analysis may demonstrate the ways in which certain versions of innovation get sidelined when discussed in unfavorable institutional

⁶. The expression “regimes of innovation” is sparsely used in the STS literature (for an approach that is close to my use of the terms see: Barben, 2007). Innovation scholars have introduced the expression “innovation regimes” to characterize the “principles, norms and ideology, rules and decision-making procedures forming actors’ expectations and actions in terms of the future development of a technology” (Godoe, 2000, p. 1034).

settings. For instance, the World Trade Organization (WTO) is an arena where oppositions about which regulations are scientifically grounded and which are undue trade barriers often reveal contrasted understandings of the relationships between science and society. Detailed studies of the internal functioning of the WTO show that this results in the dominance of “science-based” definitions of innovation, at the expense of approaches that bring together innovation policies and the public management of uncertainty by integrating political concerns in the regulation of technology (Winickoff et al. 2005; Bonneuil and Levidow 2012).

Critique then consists in unearthing the coproduction dynamics between public institutions (and how they imagine the conditions of their legitimacy) and regimes of innovation (Jasanoff 2004, 2005), and discussing both their normative strengths and the stability of their outcomes. This style of critique illuminates the political effects of innovation in that it discusses the political subjects that fit in a given regime of innovation at the expense of others; the public problems deemed relevant in a given regime of innovation at the expense of others. This style of critique is also attentive at the coproduction dynamics themselves, or lack thereof, as innovation regimes are tacit propositions for social ordering that might leave some people aside.

Who performs a situated critique

If innovation is understood as the manifestation of institutionalized practices, in nation-states or international organizations, then critique consists in analyzing innovation discourses and instruments so that the political principles underpinning the functioning of these institutions are made visible. In that, this style of critique differs from the critique of epistemic statements based on the evaluation of their truth-value (see section 1). Innovation, here, is not “debunked”, but situated. The analyst is positioned in certain configurations, and/or may circulate from one to another to make their consequences visible. Thus, the analytical position of this last style of critique is neither that of integration within innovation processes (as we encountered in Callon’s exploration of framing and overflowing) nor is it a bird’s eye view from where the truth about innovation can be unearthed (as in the critique of the ideology of innovation). But the proximity with the style of critique that considers innovation as ideology gets more and more evident as the situatedness of the analytical position is less visible.

Consider for instance Philip Mirowski’s *Science-mart*, which exposes the gradual development of discourses and practices of innovation in the American university, as the introduction of legal instruments such as patents and material transfer agreements made it possible to benefit financially from research results originating from publicly funded research, and go to courts over the use of proprietary data (Mirowski 2011). In Mirowski’s account, the discourse of innovation, whether it originates from innovation scholars or from research institutions, is not separable from the privatization of public knowledge. Here, innovation plays a part in the extension of neo-liberalism through the growing influence of legal devices meant to entangle ever more closely the practices of scientific research and the development of commercial applications. Mirowski documents the transformations of academic science and market, and he shows how these transformations are fuelled by private interests. For Mirowski, innovation is situated within a regime stabilized not in national or international institutions, but by a general mode of public reasoning, neo-liberalism, which subsumes scientific practices under market objectives.

The tone of Mirowski’s work is readily identifiable as “critical”, because his target is clear. He discusses how neoliberalism relies on hybrid arrangements mixing scientific research, economic interests and political objectives, thereby resulting in the privatization of knowledge. In doing so, he does not seek to situate this neoliberal regime in an American

landscape of science policy, which bears strong differences to European ones (Jasanoff 2005; Laurent 2017; Parthasarathy 2017). Nor does he situate this regime in relation to the particular technical sector, biomedicine, which is the focus of his study, whereas others such as climate science would display different configurations (Porter 2013). These details are not what matters to his approach, and one could argue that not delving into them is a condition for neoliberalism as a whole to be considered a stable enough target.

Mirowski's style of critique occupies an interesting position at the crossroads of the analysis of innovation regimes (in this case, a global regime of neoliberalism) and the uncovering of what lies behind innovation considered as an ideology (here, corporate and market interests). As such, it can be paralleled with the actions of activist groups also critical of innovation. One of such groups is *Pièces et Main d'Oeuvre* (PMO, "parts and labors"), an activist group based in Grenoble, in South-East France,⁷ which sees innovation as a perverse dynamic bound to blur boundaries between activities that would be better kept separated (see e.g. PMO 2012). PMO's critical perspective is close to that of scholars like Mirowski. But while academic critics like Mirowski adopts the epistemological standpoint of the academic scholar, able to see what others cannot thanks to his or her methodological rigor and analytical skills, the position of PMO is different. It is based on what the activists call "critical inquiry". It consists in tracking the connections between the worlds of science, industry and politics. It is deeply skeptical of the value of social science, particularly as it attempts to transform innovation processes from within, under the banners of "participation" or "responsibility", which the group interprets as serving the interest of a new class of self-styled experts, only interested in selling pre-packaged participatory mechanisms. But PMO is not much satisfied with social scientists whose have been keen of distancing themselves with calls for "participatory" or "responsible" innovation. Their position has to do with how the activists envision the social world and their own political position within it. They see a world made of conflicting interests, where everyone competes for promoting his or her particular needs. Thus, a scholar will seek recognition and possibly research contracts, and a civil society group will defend its particular interest. Accordingly, PMO has been careful not to be seen as a civil society group, but by a collection of anonymous "simple citizens". "Simple citizen" is the author of numerous of PMO's papers, and an imaginary figure who is radically separated from all domains of social life.

PMO might be an anecdotal example in the landscape of the critique of innovation, yet it provides a crucial lens for us to understand the connections between the critique of innovation as ideology and the critique of regimes of innovation. PMO's critique sees innovation as the outcome of incestuous relations between domains of social activities – science, economy, politics – which would be better kept separated. Developed through the analysis of the historical evolution of science policy of Grenoble (PMO 2012), it is a critique of a regime of innovation, but less situated in particular institutional constructs than contestable in general. It can partly be described in the terms introduced in the first section of this chapter in that it seeks to reveal the true nature of innovation, which is, for the critics, a power play pursued for the sake of contestable interests. But contrary to the critics of the religion of innovation, no attempts at reform are undertaken. Rather, the very nature of innovation is considered problematic and it is in that sense that this critique can be considered radical. It is also radical in its means of action, in that it seeks to escape the threat of integration in contestable social dynamics (and of being turned into a reformer) by maintaining an impassable analytical distance. As such, no less than the disappearance of the critical individual behind an anonymous figure is required. By bringing all manifestations of

⁷. See Laurent (2017); Meyer (2017).

innovation into a single set of contestable practices, this radical version of the critique of innovation also loses the institutional situatedness of innovation regimes, and makes the engaged critical subject disappear behind an imaginary anonymous figure.

Conclusion

In this chapter, we have encountered several perspectives that propose to critique innovation. These explorations have led us to analyze different styles of critique, associated with different theories of innovation (see Table 21.1). These styles of critique all articulate descriptive and normative positions. They all produce statements about what things are and what they ought to be. First, the critique of the ideology of innovation often uses a religious vocabulary to confront “myths” with established facts, and propose reforms. Innovation, here, is a discourse meant to describe and prescribe, which the critic should evaluate according to the validity of the representations of the world it proposes, and the consequences of these representations. Second, innovation can be considered as an engine for critique, if seen as a dynamic process always entangling framing and overflowing. In this perspective, critique is part and parcel of innovation, and performed both by concerned groups and by analysts eager to give voice to them. Third, innovation can be understood as situated in heterogeneous regimes that associate it with more or less explicit propositions for social ordering. Critique then consists in making these associations visible, and possibly using comparison to de-naturalize them.

Table 21.1 Three styles of critique of innovation

Styles of critique	Contesting the ideology of innovation	Considering innovation as an engine for critique	Analyzing innovation regimes
Theory of innovation	Innovation as a program based on descriptive statements and associated prescriptions.	Innovation as the productive outcome of framing/overflowing processes.	Innovation as situated in institutionalized economic, political and social configurations.
Objective of the critique of innovation	<ul style="list-style-type: none"> - Debunking myths. - Reforming innovation. 	<ul style="list-style-type: none"> - Integrating overflows. - Re-defining technical and social identities accordingly. 	<ul style="list-style-type: none"> - Making co-production dynamics explicit. - Using comparison to explore alternatives.
Identity and position of the critics	<ul style="list-style-type: none"> - Scholars and journalists contesting the truth value of innovation discourses. - Reformists in 	<ul style="list-style-type: none"> - Concerned groups affected by exclusion mechanisms. - Scholars studying/working 	<ul style="list-style-type: none"> - Analysts circulating from one situated position to the next.

	innovation studies.	with these groups.	
--	---------------------	--------------------	--

These three styles of critique are not disconnected with each other. The critique of the ideology of innovation is caught in a flow of integration, reform and further critique that echoes the Callonian dynamics of framing and overflowing. This dynamics is itself situated in a particular regime of innovation, which Callon describes as “intensive”. The analysis of innovation regimes can lead to unearth systemic forces such as “neoliberalism”, or perhaps even more general dynamics that would fundamentally pervert innovation. If one moves away from its situatedness, then innovation can well be described as an ideology.

But the three styles of critique sketched in this chapter also differ according to the role and position of the analyst. While the first one pre-supposes an analytical distance from which one can compare the ideology with actual social processes, the second relies on an engaged position in the midst of innovation processes. The critique of situated regimes of innovation invites the analyst to experiment with original epistemic and political standpoints, as she circulates from one site to others in order to draw comparisons, is attentive to tensions and controversies, and explores the possibilities of alternatives. The analysis of innovation regimes does not offer definite rules to do so. Instead, it suggests that critics ought to experiment with their analytical distances in order to ensure both meaningful scholarly productions and significant political interventions.

References

- Barben, Daniel (2007), ‘Changing regimes of science and politics: Comparative and transnational perspectives for a world in transition’, *Science and Public Policy*, 34 (1), 55–69.
- Barthe, Yannick (2006), *Le pouvoir d’indécision. La mise en politique des déchets nucléaires*, Paris, Economica.
- Berkun, Scott (2010), *The myths of innovation*, Sebastopol, CA: O’Reilly Media.
- Boltanski, Luc and Eve Chiapello (2005), *The new spirit of capitalism*, London and New York: Verso.
- Boltanski, Luc (2011), *On critique. A sociology of emancipation*, Cambridge: Polity.
- Bonneuil, Christophe and Les Levidow (2012), ‘How does the World Trade Organization know? The mobilization and staging of scientific expertise in the GMO trade dispute’, *Social Studies of Science*, 42 (1), 75–100.
- Butler, Judith (2002), ‘What is critique? An essay on Foucault’s virtue’, in David Ingram (ed.), *The political: Readings in continental philosophy*, London: Blackwell, pp. 212–28.
- Callon, Michel, Millo, Yuval and Fabian Muniesa (ed.) (2007), *Market devices*, Malden, MA: Blackwell.
- Callon, Michel and Vololona Rabeharisoa (2004), ‘Gino’s lesson on humanity: Genetics, mutual entanglements and the sociologist’s role’, *Economy and Society*, 33 (1), 1–27.

- Callon, Michel and Vololona Rabeharisoa (2008), 'The growing engagement of emergent concerned groups in political and economic life: Lessons from the French association of neuromuscular disease patients', *Science, Technology and Human Values*, 33 (2), 230–61.
- Callon, Michel, Pierre Lascoumes and Yannick Barthe (2009), *Acting in an uncertain world*, Cambridge, MA: MIT Press.
- Callon, Michel (1999), 'Ni intellectuel engagé, ni intellectuel dégagé: la double stratégie de l'attachement et du détachement', *Sociologie du travail*, 41 (1), 65–78.
- Callon, Michel (2007), 'An essay on the growing contribution of economic markets to the proliferation of the social', *Theory, Culture and Society*, 24 (7-8), 139–163.
- Callon, Michel (2012), 'Quel rôle pour les sciences sociales face à l'emprise grandissante du régime de l'innovation intensive?', *Cahiers de recherche sociologique*, 53, 121–65.
- Callon, Michel (2017), *L'emprise des marchés: comprendre leur fonctionnement pour pouvoir les changer*, Paris: La Découverte.
- Chance, Quentin and Morgan Meyer (2017), 'L'agriculture libre. Les outils agricoles à l'épreuve de l'open source', *Techniques & Culture*, 67 (1), 236–39.
- Cook, Lisa (2019), 'The innovation gap in pink and black', in Matthew Wisnioski, Eric Hintz and Marie Stelttler Kleine (eds), *Does America need more innovators?* Cambridge: MIT Press, pp. 221–47.
- de Saille, Stevienna (2015), 'Innovating innovation policy: The emergence of "Responsible Research and Innovation"', *Journal of Responsible Innovation*, 2 (2), 152–68.
- Delvenne, Pierre and François Thoreau (2012), 'Beyond the "charmed circle" of OECD: New directions for studies of national innovation systems', *Minerva*, 50 (2), 205–19.
- Dewey, John (2012), *The public and its problems. An essay in politique inquiry*, University Park: Pennsylvania State University Press.
- Edgerton, David (1999), 'From innovation to use: Ten eclectic theses on the historiography of technology', *History and Technology, an International Journal*, 16 (2), 111–36.
- Edquist, Charles (2014), 'Striving towards a holistic innovation policy in European countries – but linearity still prevails!', *STI Policy Review*, 5 (2), 1–19.
- Ellul, Jacques (1988), *Le bluff technologique*, Paris, Hachette.
- Epstein, Steve (1996), *Impure science. AIDS, activism and the politics of knowledge*, Berkeley, CA: University of California Press.
- Ernst & Young and CEPS (2011), Next generation innovation policy. The future of EU innovation policy to support market growth (https://www.ceps.eu/wp-content/uploads/2011/10/innovation_report.pdf).
- Evans, James, Gabriele Schliwa and Katherine Luke (2016), 'The glorious failure of the experimental city: Cautionary tales from Arcosanti and Masdar City', in James Evan, Andrew Karvonen and Rob Raven (eds), *The experimental city*, London: Routledge, pp. 218–35.

- Fagerberg, J., Verspagen, B (2009), 'Innovation studies – the emerging structure of a new scientific field', *Research Policy*, 38, 218–33.
- Foucault, Michel (1984), *L'usage des plaisirs*, Paris: Gallimard.
- Foucault, Michel (1994), *Dits et Ecrits*, vol. 4, Paris: Gallimard.
- Foucault, Michel (1997), 'What is critique?', in Sylvère Lotringer (ed.), *The politics of truth, Semiotext(e)*, pp. 41–81.
- Fuller, Steve (2010), 'The new behemoth', *Contemporary Sociology*, 39 (5), 533–6.
- Godin, Benoît (2006), 'The linear model of innovation: The historical construction of an analytical framework', *Science, Technology and Human Values*, 31 (6), 639–67.
- Godin, Benoît (2009), 'National innovation system: The system approach in historical perspective', *Science, Technology and Human Values*, 34 (4), 476–501.
- Godin, Benoît (2015), *Innovation contested: the idea of innovation over the centuries*, London: Routledge.
- Godin, Benoît (2019), 'How innovation evolved from a heretical act to a heroic imperative', in Matthew Wisnoski, Eric S. Hintz and Marie Stettler Kleine (eds), *Does America need more innovators ?* Cambridge: MIT Press, pp. 141–64.
- Godin, Benoît and Dominique Vinck (eds) (2017), *Critical studies of innovation. Alternative approaches to the pro-innovation bias*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing.
- Godoe, Helge (2000), 'Innovation regimes, R&D and radical innovations in telecommunications', *Research Policy*, 29 (9), 1033–46.
- Halpern, O., LeCavalier, J., Calvillo, N. and Pietsch, W (2013), 'Test-bed urbanism', *Public Culture*, 25 (2), 272–306.
- Hyysalo, Sampsa, Torben Elgaard Jensen and Nelly Oudshoorn (eds) (2016), *The new production of users: Changing innovation collectives and involvement strategies*, London: Routledge.
- Jasanoff, Sheila (ed.) (2004), *States of knowledges. The coproduction of science and social order*, London: Routledge.
- Jasanoff, Sheila (2005), *Designs on nature. Science and democracy in Europe and the United States*, Princeton: Princeton University Press.
- Joly, Pierre-Benoît (2017), 'Beyond the competitiveness framework? Models of innovation revisited', *Journal of Innovation Economics & Management*, 1 (22), 79–96.
- Joly, Pierre-Benoît (2019), 'Re-imagining innovation', in Sébastien Lechevallier (ed.), *Innovation beyond technology*, Singapore: Springer, pp. 25–45.
- Jones, Steven E (2006), *Against technology: From the Luddites to neo-Luddism*, London: Routledge.

- Kelty, Christopher (2008), *Two bits: The cultural significance of free software*, Durham, NC: Duke University Press.
- Lascoumes, Pierre and Patrick Le Galès (2007), ‘Introduction: Understanding public policy through its instruments – from the nature of instruments to the sociology of public policy instrumentation’, *Governance*, 20 (1), 1–21.
- Latour, Bruno (2004), ‘Why has critique run out of steam? From matters of fact to matters of concern’, *Critical Inquiry*, 30 (2), 225–48.
- Laurent, Brice (2017), *Democratic experiments. Problematizing nanotechnology and democracy in Europe and the United States*, Cambridge: MIT Press.
- Law John (2010), ‘The Greer-Bush test: on politics in STS’, in Madeleine Akrich et al. (eds), *Débordements: Mélanges offerts à Michel Callon*, Paris: Presses des Mines, pp. 269–81.
- Leary, John Pat (2018), ‘Innovation and the neoliberal idioms of government’, *Boundary*, 2 online: <http://www.boundary2.org/2018/08/leary/>.
- Lemke, Thomas (2011), ‘Critique and experience in Foucault’, *Theory, Culture & Society*, 28 (4), 26–48.
- Lepore, Jill (2014), ‘The disruption machine. What the gospel of innovation gets wrong’, *The New Yorker*, 23, 30–6.
- Marres, Noortje (2007), ‘The issue deserves more credit. Pragmatist contributions to the study of public involvement in controversy’, *Social Studies of Science*, 37(5), 759-780.
- Martin, Ben R (2012), ‘The evolution of science policy and innovation studies’, *Research Policy*, 41 (7), 1219–39.
- Martin, Ben R (2016), ‘Twenty challenges for innovation studies’, *Science and Public Policy*, 43 (3), 432–50.
- Matsumoto, Mitsutaka and Kotaro Kawajiri (2012), ‘Information and communication technology as an exporter of CO₂ emissions’, in Karl-Erik Sveiby, Pernilla Gripenberg and Beata Segercrantz (eds), *Challenging the innovation paradigm*, London, Routledge, p. 229.
- Mazzucato, Mariana (2015), *The entrepreneurial state: Debunking public vs. private sector myths*, London: Anthem Press.
- Meyer, Morgan (2017), ‘“Participating means accepting”: Debating and contesting synthetic biology’, *New Genetics and Society*, 36 (2), 118–36.
- Mirowski, Philip (2011), *Science-mart*, Cambridge, MA: Harvard University Press.
- Oudshoorn, Nelly and Trevor Pinch (2003), *How users matter: The co-construction of users and technologies*, Cambridge, MA: MIT Press.
- Parthasarathy, Shobita (2017), *Patent politics: Life forms, markets, and the public interest in the United States and Europe*, Chicago: Chicago University Press.
- Pestre, Dominique (2008), ‘Challenges for the democratic management of technoscience: Governance, participation and the political today’, *Science as Culture*, 17 (2), 101–19.

- Pièces et Main d'Oeuvre (PMO) (2012), *Sous le soleil de l'innovation*, Paris: La Fabrique.
- Pfotenhauer, Sebastian, Joakim Juhl and Erik Aarden (2019), 'Challenging the "deficit model" of innovation: Framing policy issues under the innovation imperative', *Research Policy*, 48 (4), 895–904.
- Pfotenhauer, Sebastian and Sheila Jasanoff (2017), 'Panacea or diagnosis? Imaginaries of innovation and the 'MIT model' in three political cultures', *Social Studies of Science*, 47 (6), 783–810.
- Pfotenhauer, Sebastian (2019), 'Building global innovation hub: The MIT model in three start-up universities', in Matthew Wisnioski, Eric Hintz and Marie Stelttler Kleine (eds), *Does America need more innovators?*, Cambridge: MIT Press, pp. 191–220.
- Porter, James (2013), 'Science-mart, by Philip Mirowski', *Society+Space*, online (<https://societyandspace.org/2013/06/13/science-mart-privatizing-american-science-by-philip-mirowski-reviewed-by-james-porter/>).
- Poulat, Emile (1962), *Histoire, dogme et critique dans la crise moderniste*, Paris: Casterman.
- Russel, Andrew and Lee Vinsel (2019), 'Make maintainers: engineering education and an ethics of care', in Matthew Wisnioski, Eric Hintz and Marie Stelttler Kleine (eds), *Does America need more innovators?*, Cambridge: MIT Press, pp. 249–69.
- Sanders, Lucinda and Catherine Ashcraft (2019), 'Confronting the absence of women in technology innovation', in Matthew Wisnioski, Eric Hintz and Marie Stelttler Kleine (eds), *Does America need more innovators?* Cambridge: MIT Press, pp. 323–43.
- Schumpeter, Joseph (2003 [1943]), *Capitalism, socialism and democracy*, London, Routledge.
- Soete, Luc (2013), 'Is innovation always good?', in Jan Fagerberg, Ben Martin and Ebsen Andersen (eds), *Innovation studies – evolution and future challenges*, Oxford: Oxford University Press, pp. 134–44.
- Stilgoe, Jack, Richard Owen and Phil Macnaghten (2013), 'Developing a framework for responsible innovation', *Research Policy*, 42 (9), 1568–80.
- Stirling, Andy (2014), *Democratising innovation*, SPRU, University of Sussex, http://sussex.ac.uk/Users/prfh0/innovation_democracy.pdf.
- Stirling, Andy (2008), "'Opening up' and 'closing down' power, participation, and pluralism in the social appraisal of technology", *Science Technology and Human Values*, 33 (2), 262–94.
- Sveiby, Karl-Erik (2017), 'Unattended consequences of innovation', in Benoit Godin and Dominique Vinck (eds), *Critical studies of innovation*, Cheltenham, UK and Northampton, MA, USA: Edward Elgar Publishing, pp. 137–56.
- Sveiby, Karl-Erik, Pernilla Gripenberg and Beata Segercrantz (eds) (2012), *Challenging the innovation paradigm*, London: Routledge.

- Talvard, Félix (2018), 'Can urban "miracles" be engineered in laboratories?', in Claudio Coletta, Leighton Evans, Liam Heaphy and Rob Kitchin (eds), *Creating smart cities*, Routledge, pp. 90–103.
- Thorpe, Charles (2010), 'Participation as post-Fordist politics: Demos, new labour, and science policy', *Minerva*, 48 (4), 389–411.
- von Hippel, Eric (2004), *Democratizing innovation*, Cambridge MA: MIT Press.
- Winickoff, David et al (2005), 'Adjudicating the GM food wars: Science, risk, and democracy in world trade law', *Yale Journal of International Law*, 30, 81.
- Wisnioski, Matthew, Eric Hintz and Marie Stelttler Kleine (eds) (2019), *Does America need more innovators?*, Cambridge: MIT Press.