

Experimental failure

Notes on the limits of the performativity of markets

Noortje Marres and Linsey McGoey

October 2012

Abstract:

In a context of proliferating crises, from the environment to the economy, the politics and epistemology of “failure” – institutional, human, technological, environmental – is acquiring fresh relevance. Recent analyses in social studies of science and technology, as well as in political and economic sociology, have developed performative perspectives on this issue, and much of this work has focused on ‘market experiments.’ In this article, we suggest that these performative perspectives on market experiments suffer from some of the same shortcomings as market experiments themselves: they are biased towards success, and limited in their ability to acknowledge failure. Here, we seek to address this shortcoming by developing a three-fold typology. Adopting an expansive notion of experiments in political economy, we argue that an adequate analysis requires further interrogation of the multifaceted nature of experimental failure, in particular of its alternatively restrictive and generative aspects. In order to explore the diverse, overlapping, and often paradoxical effects of experimental failures – such as the way that failures can both create and diminish opportunities to challenge the authority of existent political and economic frameworks

– we distinguish three types of failure: 1) entropic failure; 2) generative failure; and 3) performative failure.

1. Introduction

Disasters unfolding on various planes, from the environment to finance and the humanitarian, have raised questions about the capacities of predominant empirical knowledge regimes to identify systemic and other deep-rooted failures, and to provide the means to address them. Various allegedly unexpected crises have brought into relief the susceptibility of these regimes to co-optation by aspirational discourses, and pervasive commitments to ‘thinking positive, saying positive’, to use a phrase of the novelist Saunders (2001). From this vantage point, the inability to identify and own up to failure, in short, the inability to fail, presents a notable element in a wider complex problematic in which market democracies seem to become increasingly vulnerable to more or less irreparable failures, from climate change to the banking sector and the welfare state. In this article, we approach this problem by turning to *experiments* as a prevalent public form in contemporary market democracies, and the question of *their capacity to fail*.

This question of experimental failure, we propose, is especially important given a further observation: perspectives on political economy that have recently been developed in the social sciences, namely performative ones, seem not very well equipped to acknowledge failure either. But the capacity to identify and affirm failure, we want to argue, today seems especially critical to the efficacy of the empirical knowledge regimes in which liberal democracies are invested. However this issue of

experimental failure is precisely one which currently prominent perspectives in economic and political sociology are in some respects *not* dealing with very well.

The issue of experimental failure is some respects an ‘old’ issue. Liberal or market democracies have long been characterized in terms of their commitment to experimental knowledge as a privileged form of public and political life (Ezrahi, 1990; Turner, 2003). There is a remarkable paradox here. On the one hand, what stands out about the 20th century commitment to experimentalism as a public form is precisely the affirmation of the *corrigibility* of failure, what some have called liberal democracies investment in problem-solving (Arendt, 1958; Wolin, 1960 (2004)) and others have termed fallibilism (Popper, 1963). Indeed, this affirmation of the corrigibility of specific failures is one way in which the concept of political, societal or environmental failure can be distinguished from the idea of crisis, which can only be addressed integrally. On the other hand, however, 20th century philosophy of science have precisely questioned the possibility to falsify experimental propositions (Duhem, 1982 (1906)); Kuhn, 1996 (1962)). Transposing this insight into the realm of democratic politics, one could say that experimentalism has its own momentum, as a public form that is enacted and re-enacted, in a ritualistic confirmation of the corrigibility of failure, something which only rarely in fact occurs.

The issue of experimental failure has special salience in social and political theory today. Here, performative perspectives on economy and politics have risen to prominence, and these perspectives similarly display a preference for the experiment as a public form, and they, too, can be criticized for a ‘bias towards success’ (Miyazaki and Riles, 2005). We will present this critique in more detail below, and while we

agree with it, we will also argue that there is no easy way out of this conundrum, insofar as there is no end-point to performativity. The failures of experiments, and of empirical knowledge regimes more widely, then, are not exempt from the theory of performativity: the affirmation of failure, like everything else, requires performative investment. There is nothing ‘natural’ about failure, either. Especially in the contemporary context, this makes it all the more important to attend to failure, and we argue, to appreciate its multi-faceted nature. Thus, in this article we explore different forms, and normative capacities, of experimental failure: experimental failure may either engender opportunities for the mobilization of actors and articulation of claims or it may restrict avenues for contestations; and the attribution of failure to an experimental arrangement may either constrain or strengthen capacities for research and critical inquiry, on the part of social science, regulatory authorities, or ‘the actors themselves.’ Experimental failure, then, may have simultaneously or alternatively restrictive and generative aspects.

To explore this last feature, we will consider a range of recent experiments in political economy, broadly conceived, in fields such as pharmaceuticals and sustainable technology, and on that basis, we will sketch a typology of experimental failure: 1) entropic failure; 2) generative failure and 3) performative failure. The first, ‘entropic failure,’ explores the ways in which failed experiments rarely result in the delegitimization of their own effectiveness; on the contrary, failure serves to compound and solidify the authority of the individuals and institutions that presided over the failing arrangements to begin with. In these cases, failure is typically *degenerative* in its effects, leading to a sort of political decay or stalemate where the

answer to failing technologies or methodologies is an inevitable recourse to the same methods that precipitated problems in the first place. The second, ‘generative failure,’ approaches failure as a productive event, in which experiments provide opportunities for the demonstration of flaws and insufficiencies of the propositions and arrangements that they put to the test. Here experimental failure is conceived of as a moment of articulation, occasioning processes of the organisation of actors and the articulation of issues. Thirdly, and finally, we look at ‘performative failure,’ or the ways in which the characterization of a given politico-economic arrangement in experimental terms, may either limit or expand capacities for research and critical inquiry in relation to that arrangement.

Distinguishing between types of failure, we feel, provides a way to begin to address the ‘inability to fail’ in the theory and practice of market experiments, for a number of reasons. To begin with, typology is a way of amplifying differences among aspects that may otherwise be conflated. Secondly, different types of experimental failure are likely to require different analytic and normative strategies on the part of social research and theory that seeks to address them. The aim of typology, then, is to provide some guidance as to which analytic and normative strategy is appropriate when. Relatedly, typology is also a way of ‘lightening’ the differences between various perspectives on public experiments developed in social theory: to make a typology is to approach different theories about experimental politics as identifying different aspects of similar phenomena. In particular, by making a typology we seek to bring two opposite approaches into relation with one another: social theories which take their cue from liberal theory, and those that specialize in the critique of liberalism.

What is needed, we argue, is a move beyond the strict opposition between the liberal investment in experimentalism and its critique. We need a more fine-grained appreciation of different forms of political experimentalism. While this may be taken as an attempt to emphasise continuities, we end this article by stressing the importance of identifying the different conditions under which it becomes important to attend to the different aspects of experimental failure.

2. Too performative to fail?

Experiments have long been attributed special importance as a genre of public life in liberal democracy and in the liberal political economy. 20-century liberal thinkers from John Dewey to Karl Popper and Richard Rorty have celebrated experiments as offering the right attitude and format for doing knowledge, politics and ethics in modern societies. More recently, sociologists and historians of ‘scientific liberalism’ have directed attention to the experimental epistemology at the heart of liberal democracy (Ezrahi, 1990; Turner, 2003). In these accounts, liberal democracy does not just evince a strong commitment to the ‘empirical base’ of opinion-, decision-, and policy-making. Rather, the experimental form of knowledge-making is here elevated to a principal form for organising public life, through rituals of public inquiry and accountability. Work in the social studies of science and technology, moreover, has attributed to experiments special affordances as devices of social, political and economic *intervention*. Work in this field has singled out scientific experiments and technological demonstrations as particularly effective means for the re-configuration

of social, political and economic relations, with examples ranging from the 19th century invention of the anthrax vaccine to the introduction of ultrasound technologies in the 20th (Latour, 1993; Callon, 1986)

Drawing on these earlier studies, recent performative approaches in economic sociology have equally singled out experiments as a crucial device for intervening in political economy. Experimental arrangements of knowledge and action, from consumer preference research to carbon emissions trading schemes, are signalled for providing particular clear instantiations of the performatist argument: the point that “forms of knowledge enact their objects, or help to render them explicit” (Muniesa et al, 2007; p. 5). Market experiments here figure as a sub-set of the broader category of market devices, whose merit it is to provide *concrete* (or explicit) instantiations of performatism. In experimental arrangements, the deployment of scientific knowledge and empirical technologies ostensibly and visibly plays a role in the organisation of markets. In these cases, the sciences and devices of experimental economics, accounting, marketing, and so on, are clearly identifiable as a means for extending markets, the rendering transferable and thus tradable of more or less virtual goods, and the organisation of market actors in the process (Beunza and Stark, 2002; Lezaun, 2007; Muniesa and Callon, 2007; MacKenzie, 2009).

The performative perspectives developed in the social studies of markets have recently been criticized for ascribing a certain *efficacy* to economic mechanisms (Miyazaki and Riles, 2005; Arena, 2010; see also Didier, 2009). Thus, Hirokazu Miyazaki and Annelise Riles (2005) suggest that what is most distinctive about performative perspectives in the social studies of finance and economics is their

commitment to account for the ways in which economic knowledge and political economic mechanisms *work*, as opposed to critical programmes in economic sociology that preceded it, and which sought to demonstrate their limits and flaws. This ‘affirmative’ effect of performative perspectives in economic sociology can also be recognized in relation to experimental arrangements. For example, in the essay ‘Civilizing Markets: Carbon trading between in vitro and in vivo experiments,’ Michel Callon has noted how the European carbon market has been explicitly termed ‘an experiment’ by the actors involved, i.e. the EU, and he endorses this definition insofar as it brings into view a particular dynamic of market formation: “Mechanisms are set up to identify the effects produced, the bugs encountered, and the reactions triggered, so that they can be taken into account and the architecture of the markets under experimentation altered” (Callon, 2009).

One of the things that sets an experimental understanding of markets apart from a non-experimental one, according to Callon, is that the former conceives of critiques and ‘problematizations’ of market arrangements as part of - and indeed partly constitutive of - the process of market formation. This, in turn, implies three further characterizations of markets: 1) by defining markets as experiments, market formation may appear to be rather like scientific research; 2) defining markets as experiments allows for an inclusive definition of the market; it includes the range of actors across science, civil society and so on, thus dissolving the distinction between market actors and stakeholders; and 3) an experimental conception of the market helps to encourage a particularly flexible and mutable understanding of their effectiveness, one that is open to seeing “market failures” as constitutive of new opportunities and

entanglements, rather than merely dismissible as evidence of faulty planning or corrupt behaviour. As Callon put it: “the design process must necessarily consist of a long process of trial and error,” something that militates against purely negative specifications of market dysfunction. In this respect, we suggest that experimental conceptions of market devices in particular evince the complication noted by Riles and Miyazaki, namely that such perspectives are biased towards the success of markets, rather than their failure.

The preoccupation with the efficacy of market instruments has been problematised in various ways. Miyazaki and Riles emphasise its limitations as an ethnographic project. They note that a socio-technical focus on how the market works “celebrates ...the mystique of finance.” As such, they note, “it drowns out the currently dominant mode of apprehension of the market among participants [...] [namely] a shared perception of failure” (p. 320; see also Arena 2010). One could add that a preoccupation with the efficacy of market instruments risks forgetting other analytic insights of ‘performative’ studies from the field of STS. Thus, we can note how ‘a bias towards the efficacy’ of economic instruments resonates with earlier criticisms levelled against performative perspectives developed in actor-network theory, in particular – namely their investment in the capacity of science and technology to ‘change the world,’ never mind the imperialist ramifications, and their lack of attention to all the ways in which science and technology have proved impressively *ineffective* as instruments of social, political and moral reconfiguration (Haraway, 1994; Leigh Star, 1991; Mol, 2002). In the context of political economy, the performatist ‘bias towards success’ might be seen to contribute to an effect that

Fran Tonkiss (2008) terms capitalocentrism – the overstating of the extension of capitalist mechanisms and their hold on the economy overall.¹

Furthermore, the issue of the experimental bias towards success also harks back to earlier debates in the philosophy of science, with the holistic approach of Pierre Duhem presenting one notable point of return. Pierre Duhem defined what we can retrospectively term ‘the problem of experimental failure’: when criteria of experimental success are not met, it is impossible to determine conclusively whether this ‘failure’ should be attributed to either the experimental set-up; the theoretical framework, or the empirical proposition under scrutiny itself. In making this argument, Duhem suggested that experimental failure is under-determined by the experimental apparatus. One could say that, in doing so, he brought experimental failure within the realm of the constructed and the performed. Experimental failure, as much as success, is then subject to interpretative flexibility (the term is Bijker & Pinch’s, 1984); experimental results may be interpreted in a variety of ways which are never fully constrained or commanded by the experimental arrangements themselves. From Duhem onwards, philosophers and sociologists of science and technology, have elaborated on the ways in which failure is inevitability and unavoidably a matter of interpretation, construction and performance (Kuhn, 1996 (1962); Latour, 1996; Miyazaki and Riles, 2005). Indeed, performative perspectives on market arrangements developed by the ‘new’ economic sociology can be said to reflect the Duhemian argument about the constructed nature of ‘experimental results,’ extending it to the

¹ It is a simple, effective argument: capitalism conventionally is understood as a total, and dominant, economic system, but a great deal of most people’s economic lives are spent in non-capitalist activities in the public or non-profit sectors, in cooperatives and mutuals, in the home, in caring, self-provisioning, swapping, barter, doing favours, theft, cadging and so on (Tonkiss, 2008; Gibson-Graham, 2006).

analysis of politico-economic arrangements. What we would like to highlight is that these perspectives are in danger of replicating the very bias towards success which Duhem sought to highlight.

The continuities between Duhem and currently fashionable performative perspectives on political economy also indicate that there may be deeply buried assumptions contributing to the privileging of success in the latter. Indeed, it should be noted that some authors associated with the performative approach in economic sociology have proposed that we speak not so much of public experiments but of ‘public demonstrations’ (Barry, 2001; Girard and Stark, 2007). Experimental arrangements today frequently play a promotional role (Thrift and French, 2002). And as experiments function not so much as critical trials but rather as publicity devices, the possibility of their failure seems to move beyond the horizon. In the following sections, we wish to take seriously the possibility of experiments to fail, while also taking into account the various problematisations of experimental failure discussed above. We will do this by focusing on the ways in which experimental devices can be ascribed the capacity to organise political economies, *without this capacity being predicated on the efficacy of these instruments*. Thus we consider failure as one significant aspect of the ability or inability of experiments to ‘intervene’ in social, political and economic relations. We propose to do so through a typology of failure which we develop below in a discussion of a number of case studies of politico-economic experiments, broadly conceived.

3. Entropic Failure

In spring 2010, the *New Yorker* and the *Atlantic* ran remarkably similar profiles of Timothy Geithner, the US Treasury Secretary. The articles – “Inside Man,” in the *Atlantic* and “No Credit,” in the *New Yorker* – are similar in their tone and their findings, generally praising Geithner’s strategy for improving economic stability in the aftermath of the economic crisis, suggesting his plan has been more effective and less expensive than anyone predicted at the outset of the crisis (Cassidy 2010; Green 2010).

Something notable about both articles is that they contain little of the criticism that first plagued Geithner’s appointment over a year earlier, when many commented that due to Geithner’s previous positions – such as serving from 2003 to 2009 as the president of the New York Federal Reserve, during a time when calls for stricter regulation of the derivatives market were generally deflected or mitigated under his supervision – he might not be the best individual to amend a system he thrived within. Noam Chomsky summarized the tenor of concern during an interview on the US public radio programme *Democracy Now* in April 2009: “The current Obama-Geithner plan is not very different from the Bush-Paulson plan. I mean, somewhat different, but circumstances have changed...it’s still based on the principle that we have to – somehow, the taxpayer has to rescue the institutions intact. They have to remain intact, including the people who, you know, destroyed the economy. In fact, they are the ones who Obama picked to fix it.” Chomsky suggested that rather than receiving

government appointments, most of the individuals selected as Obama's advisors "should be getting subpoenas."²

In June 2009, the US treasury published a plan for a number of financial reforms, largely orchestrated by Geithner. Key components of the plan, as Joshua Green describes, include imposing constraints on the leverage firms can use; the establishment of a clearinghouse for derivatives, which would subject the instruments to marginally more oversight, and creating more tools for shareholders to express criticism of executive remuneration – but not to interfere with or limit executive pay or bonuses. Most striking about the reforms was their adeptness at leaving largely unaltered the “two worlds Geithner knows best, Wall Street and Washington” (Green 2010).

The 2009 economic reforms represent something like an extreme caricature of an insight that emerges from Michael Power's work on failed systems of audit and regulation, where he notes that a curious feature of failed systems of audit and risk management is how rarely they call into their question own legitimacy. The solution to failed audits is typically *more* audits, rendering systems of audits most impervious to change at the very point when individuals speak of their widespread ineffectiveness.

As Power writes:

The great puzzle of financial audit is that it has never been a more powerful and influential model of administrative control than now, when many commentators talk of an auditing crisis. Accordingly, I suggest that the audit explosion shares

² Noam Chomsky on the Global Economic Crisis, Healthcare, US Foreign Policy and Resistance to American Empire. *Democracy Now*, April 13, 2009. See http://www.democracynow.org/2009/4/13/noam_chomsky_on_the_global_economic.

an important character with all kinds of policing: all have problematic criteria of success and are generally only publicly visible when they are seen to fail. But failure generally leads to a call for more policing and only rarely for a thorough analysis of why policing is failing (Power 1994: 7; 2007).

Even when the gravity of a crisis provokes attention to problems of “systemic risk,” or leads to calls for radical regulatory change, the very explicitness of the failure tends to strengthen demands for more of the same tools of audit or risk management which proved ineffective at an earlier stage, resources which are typically mobilized by those who have been, perversely, *most* implicated in causing the crisis. We suggest the example of Geithner represents an “extreme caricature” because Geithner’s very public limitations at reshaping the regulatory arenas he thrived at keeping intact helps to illuminate both the banality and the pervasiveness of the phenomenon we are describing: everyone knows that crisis situations often tend to benefit perpetrators at the expense of witnesses or victims; the surprise is that so many observers, at the outset of 2007 crisis, assumed that the sheer magnitude of events might enable things to be different this time.

In fact, the reverse is often true. The *larger* the crisis, the more elusive architectural, systematic change typically becomes. An irony of the ongoing crisis is that, first, calls for pouring resources into improving systems of risk detection and management are always greater the worse the problem becomes – systems of risk management thrive most when they appear to fail – and second, the very magnitude of the crisis has rendered accountability difficult for any one particular party. Both the

severity of the crisis and the scale of the crisis have compounded the difficulty of finding solutions that do not simply augment the authority and power of the crisis's main instigators. The very severity of the crisis renders it difficult to propose alternate arrangements that might exacerbate instability – radical measures are deemed too risky for desperate times; the practical space for alternative arrangements, to reiterate Power's point, is weakened at the very moment when the rhetorical demand for novel measures reaches a more feverous pitch (see also McGoey 2007; 2010).

We term this tendency “entropic failure,” our phrase for the sort of paralysis that occurs when the answer to a failed technology or methodological approach is an inevitable recourse to the same methods that led to problems in the first place, consolidating the authority of those who precipitated failures. Entropic failure is cyclical and self-reinforcing: the answer to failed technologies is typically more of them, and need for better technological solutions increases proportionately with the gravity of the deficiencies of earlier technologies. Failed technologies tend to triumph even as they appear to lose legitimacy, if only because the fallibility of earlier models or methodologies cements the need for more resources to remedy the shortcomings of earlier efforts.

The phrase entropic failure draws on the scientific definition on entropy, a term stemming from physics and defined as “a quantitative measure of the amount of thermal energy *not* available to do work” (our italics), something that can lead to “inevitable and steady deterioration of a system or a society.”³ Our use of the term

³ Dictionary.com, "entropic," in *The American Heritage® Dictionary of the English Language, Fourth Edition*. Source location: Houghton Mifflin Company, 2004. <http://dictionary.reference.com/browse/entropic>. Available: <http://dictionary.reference.com>. Accessed: February 26, 2010.

seeks to illuminate the ways that failure can deplete and limit the resources and energy available for others to seek out or defend alternative visions or experiments; entropic failure leads to a sort of systematic atrophy of opportunities. Situations seemingly marked by the intensity of their apparent chaos or volatility, such as the recent volatility of global markets, act as a sort of mirage, camouflaging the ways that new opportunities tend to stagnate as a result of volatility rather than expand.

Even solutions that appear to implement or to articulate alternative measures tend to reflect a “consensus in dissensus,” where ostensible conflict over how to remedy or ameliorate a situation serves to compound the assumption that a situation must be saved, or is worth saving. An example can be seen in Bourdieu’s analysis of the Barthes-Picard Affair in France, where he analyzes Roland Barthes and Raymond Picard’s public dispute over their differing interpretations of Racinian tragedy. Despite their apparent conflict, a shared faith of both scholars was their belief in the value of studying classical French thinkers such as Racine, compounding the inability of suggesting such a pursuit might itself be open to question. Thus “behind their apparent dispute lay a certain ‘complicity,’ ‘the *consensus in dissensus*’ which forms the unity of the intellectual field” (Bourdieu 1969; Lane 2000: 73).

3. Generative failures

There is also another type of failed experiment, namely one in which failure can be ascribed generative capacities, insofar as it provides an occasion for the articulation of issues and the mobilization of actors. This notion of productive failure can be traced back to arguments in 20th- philosophy and sociology which propose to appreciate ‘the

break down of taken-for-granted assumptions as an occasion for learning. (Dewey, 1998 (1908); Garfinkel, 1967; Callon, 1983; Latour, 1987, Woolgar, 2005). According to these arguments, the ostensible refusal of actors or entities to perform according to expectations provides a moment in which situations, objects or relations are rendered legible, and may become subject to inquiry, debate or intervention. Importantly, experimental arrangements have been singled out as uniquely equipped to facilitate this kind of generative failure, as in the case of the scientific laboratories studied by actor-network theorists, or the ‘breaching experiments’ of ethnomethodology (see Marres, 2012). Useful as they are, however, these sociological accounts have often shied away from addressing the *political* efficacy of experimental failure, something which has been usefully highlighted in the work of the pragmatist philosopher John Dewey, and contemporary adherents of his philosophy.⁴

As mentioned in the first section, John Dewey is a champion of experimentalism, and in his theory of state he posits experimental failure as an important formative dynamic of political and wider societal change. This has recently been highlighted by authors seeking to extend performatist perspectives to political sociology (Dratwa, 2005; Latour, 2001; Lindhardt, 2008; see also Marres, 2005), who return to Dewey’s classic *The Public and Its Problems* (1991 [1927]) to find conceptual support for this

⁴ Dewey’s work is especially interesting in the context of this paper, because social studies of economies often appeal to precisely his philosophy as an important source of inspiration (Muniesa, 2007; Callon, 2009). Where the performative sociology of markets tends to present Dewey as an precursor of instrumentalist strategies focused on ‘problem-solving’, we are arguing that Dewey’s work also highlights an alternative political tactic, namely post-instrumentalist practices of issue formation. The concept of generative failure is key to his formulation of this second strategy. However, it should be noted that this concept can also be recognized in other sources, such as Machiavelli’s *Prince*, where, as J.G.A. Pocock (2003 (1975)) points out, the dissolution or failure of working customs, traditions and routines, is recognized as a crucial condition for political innovation. In *The Prince*, the prime moment of politics is not when legitimacy is achieved, but when it is suspended. And from this perspective, the notion of legitimacy is not associated with a long-awaited, much desired proper order. It applies instead to those situations in which custom and tradition prove sufficient in going about business, government, and life in general, and which are relatively uninteresting as far as politics is concerned (see Marres, 2005).

project. In a famous passage, Dewey argues that the possibility for state institutions to fail is not only critical to their renewal, but constitutes an important occasion and precondition for the kind of political mobilization that institutional change is likely to require:

The formation of states must be an experimental process. The trial process may go on with diverse degrees of blindness and accident, and at the cost of unregulated procedures of cut and try, of fumbling and groping, without insight into what men are after or clear knowledge of a good state (34) even when it is achieved. Or it may proceed more intelligently, because guided by knowledge of the conditions which must be fulfilled. But it is still experimental. And since conditions of action and of inquiry and knowledge are always changing, the experiment must always be retried; the State must always be rediscovered.

Dewey, the Public and its Problems, p. 16

What is crucial for our purposes here is that Dewey's concept of experimental failure, while embracing the experimental nature of political change, at the same time makes room for failure. Dewey, in other words, does not make the narrow, empiricist assumption that experimental failure, if it occurs, can be readily identifiable and thus addressed. One could say, that Dewey's notion already incorporates and responds to the holistic critique of experimental failure, such as the one developed by Duhem discussed above.. In this respect, Dewey's notion of experimental failure can be distinguished from what we could call the 'meliorist' understanding of it. The latter

would view the identification of failure by experimental means as a first step in an organisational process of problem-solving, but Dewey's theory of the state can be seen to posit an alternative to this basic idea. He argues that institutional failures tend to go unnoticed: to render institutional failures perceptible, he notes, requires that "we break with existing institutional forms" (Dewey, 1991 [1927]: 30–31). What distinguishes a Deweyian notion of failure from other varieties is that it can *not* readily be fitted into existing procedures of knowledge- and decision-making. It is *not* easily remediable or corrigible – and that is part of its political efficacy (see Marres, 2005). Dewey, then, suggests a distinction between what could be called 'procedural empiricism,' in which failure is principally an occasion to engage in an organisational processes of problem-solving, and a more radical empiricism, in which failure figures as an occasion for a much wider and varied process of mobilization and articulation. Here, we want explore this distinction through an empirical case, namely sustainable living experiments, which facilitate the performance of experimental failure in these different ways.

The template of the 'sustainable living experiment' is today deployed by a broad range of agencies, in government, media, activism, business, science and art, for a variety of purposes. The genre is perhaps most strongly associated with (counter-)cultural movements committed to bringing about simpler and more 'natural' modes of living by social, technical and material means, from changing basic everyday habits to architectural interventions (Marres, 2012). However, recently the label of the sustainable living experiment has also been taken up by agencies in industry and government as part of their attempts to incorporate environmental concerns and measures into services, products and policies (Lovell, 2007; Karvonen and More,

2008). The term has been claimed as a label for demonstrational projects in the housing sector, one example being the ‘Ecohome’ project administered by the London Council of Camden in collaboration with University College London, the construction company Kingspan, and the NGO English Heritage. In this project, which involved the refurbishment of a Victorian social housing project to a high standard of sustainable energy use, the experimental status of the initiative was quite dramatically proclaimed. A press release, for example, pitches the Camden Ecohome as “a ground-breaking experiment to reduce carbon emissions whilst addressing heritage issues.”⁵ While the label of ‘experiment’ in these cases clearly serves a publicity purpose, this is not to say that there is no substance to the claim. In sustainable living experiments, the claim to ‘experimentality’ tends to be matched by an intense reliance on empirical devices to measure environmental performance. Thus, the Camden Ecohome was equipped with various sensors and meters to monitor the building as well as the energy practices of its inhabitants. Such devices are, in other words, technically and not merely nominally experimental arrangements.

The sustainable living experiment can be called a multifaceted experimental device, insofar as it takes different forms and is put to different purposes depending on the case. We would like to argue that the very adaptability and variability of this experimental form is key to understanding its generative potential, *including the generative potential of its failures*. To make this argument is to go against the understanding of sustainable living experiments as ‘merely’ promotional or demonstrational devices. According to such an understanding, the principal merit of the experiment as a genre of publicity is that it enables the wider circulation of a new

⁵ <http://www.carbon-innovation.com/discussion/viewtopic.php?t=512>

proposition, device or product. Applying such a perspective to sustainable living experiments, they would have to be defined as instruments for enabling the circulation of empirical technologies for environmental performance, from smart electricity meters to carbon accounting software, and thus, for preparing the ground for an economy of ‘environmental performance.’ Such an analysis would place sustainable living experiments ‘beyond success or failure’: whether or not these experiments fail or succeed qua living experiments, or even whether these devices actually work in practice, here becomes, to an extent, immaterial. What matters is the circulation of experimental forms and devices as such. Here we want to counter this reductionist interpretation of experiments, and insist that sustainable living experiments are very much capable of failure, and that this represents a crucial feature of this public form. Experimental enactments of failure may serve to make the case for action or attention to a particular area.

To provide an example of this politically generative deployment of experimental failure, public tours of sustainable showhomes often include a moment in which the tour guide pauses dramatically at an idle renewable energy source. In the case of the Camden Ecohome, the tour brought us to a biomass boiler which was wrongly installed, and a little while later, to a defunct smart meter provided by EDF that wouldn’t work in combination with said boiler.⁶ Such moments provide occasions for some hilarity, as well as for more comprehensive claims, such as the remark that ‘a boiler is only as good as the plumbers that service it,’ an observation which shifts attention from technology to issues of skills and employment. . In some cases, such

⁶ Similarly, sustainable living blogs provide catalogues of less drastic but not dissimilar interventions that proved unworkable – from having the “wrong” house for a wind turbine to the discontinuation of a bus services which made it “impossible” not to take the car (Marres, 2009).

performances of failures fit the category of the ‘tactical failure’ which has long been recognized as characteristic of the empirical mode of presentation. As pointed out by Shapin and Shaffer’s study of the emergence of modern scientific experimentation in 17th century England, drawing attention to the failures or flaws of experiments is a key rhetorical strategy in building legitimacy for these experiments (Shapin and Shaffer, 1989). Such tactical demonstration of failure can be recognized in experimental moments like the above. More generally, the tactical demonstration of failure seems to be a principal objective of sustainable living experiments undertaken by NGOs and activists.

This was the justification given by the coordinator of the Hackney-Islington Carbon Action Rationing Group, a community platform for experiments in personal carbon trading, for engaging in this undertaking. He proposed that one of the main objectives of this initiative is to draw attention to the fact that governments and institutions are *not* putting in place similar measures for the reduction of CO₂ emissions. In his account, he demonstrated that everyday people are capable of living within an ‘carbon budget’, as narrated on the group’s website and reported in news media from the Guardian to the International Herald Tribune, served to highlight the ways in which governments and industry, in spite of their commitments and available resources, had *not* accomplished this (John Ackers, personal communication). The demonstration of institutional failure, one could say, here becomes the ‘performative objective’ of social experimentation.⁷ Besides enacting institutional failure, carbon

⁷ This example also usefully illustrates that living experiments do not necessarily involve the displacement of responsibility to individual citizens, something for which “DIY concepts” of environmental engagement are sometimes criticized, and which is well summarized by the Guardian headline, advertising a “green your home”

rationing experiments also generated wider opportunities for political mobilization around issues of climate change. This initiative can be understood as an ‘experimental’ adaptation of the predominant politico-economic formula of carbon accounting: it is community-based rather than industry-driven, and the reports it generates concentrate on how bearable (or not) it is to take into account the environmental costs of mundane action, rather than on securing the profitability of sustainability measures.

The experimental performance of institutional failure, then, is generative in that it provides occasions for the articulation of issues and the mobilization of actors. By virtue of the adaptability of the format of the, sustainable living experiments, the above initiatives could develop and advocate alternative configurations of a political economy of carbon accounting. In these cases, experiments are clearly capable of much more than the mere demonstration or reinforcement of a *pre-existing* proposition or ideology, for instance the doctrine that markets can solve the environmental crisis wrought by climate change. Instead, the experimental form here makes possible the generation of contending articulations of the ‘carbon economy,’ from a municipal agenda of addressing global environmental issues through the transformation of municipal social housing arrangements, to a mundane ethics of living well. (Which is also to say, neither do experiments here offer only a *negative* critique of dominant enactments of the carbon economy: they enact positive alternatives). However, the question remains whether and how this generative capacity of experiments may come to be more widely recognized. And this brings us to the question of performative

special in the week after the Climate summit in December 2009: “The politicians failed in Copenhagen, so now it is up to you.”

failure: the extent to which research and inquiry may either limit or strengthen the political efficacy of experimental failures.

4. Performative Failure

The previous sections have focused on the epistemological, political and social consequences that ensue when experimental politico-economic arrangements fail, or are enacted as such, from arrangements of financial regulation to sustainable living.

In this section, we turn our gaze to examine another type of failure – the risk that ‘experimentalist’ modes of inquiry, adopted in the social sciences, fail to critically interrogate the arrangements defined in those terms. The characterization of a given [market] arrangement as experimental in nature, by sociologists and other analysts, itself may have political, epistemic and social effects. Our question then is whether and how the investment of analysts in labelling or ‘performing’ a given political economic arrangement as experimental, expands or limits capacities for inquiry and critique in relation to that arrangement. A related question, one that we flagged in the first section, is whether performative perspectives on experiments in political economy, more specifically, are especially vulnerable to this kind of failure. As we suggested there, performative theories may seem difficult to prove wrong; to ascribe the capacity to perform certain entities or even realities to particular devices suggests that these devices work, and that performativity works, but on what grounds is not always clear. Performative perspectives are at risk of remaining impervious to their own failure, something which since Popper’s (1963) critique of infallible knowledge

raises the question of its political and normative implications, and how these might be addressed.

Performative perspectives in economic sociology, we suggested, are highly *assymetric*, in that they tend to privilege the question of the efficacy of markets over that of how these arrangements fail. However, here we would like to address the more specific issue of whether and how, by defining arrangements as ‘experimental’, the analysis sets limits on *how* they may fail, on which types of failures will be considered and which won’t. Do experimental perspectives exclude particular modes of (experimental) failure from their analysis,, such as the wholesale ‘failure’ of market arrangements as such; or their faltering on non-technical, more ephemeral or disorderly grounds?

This possibility has been suggested recently by Judith Butler (2010), who proposes that theorists such as Callon have failed to realize the extent to which performativity itself is dependent on its own failure in order to thrive. As she writes, “performativity never fully achieves its effect, and so in this sense ‘fails’ all the time; its failure is what necessitates its *reiterative* temporality, and we cannot think iterability without failure” (Butler 2010: 153; see also Cochoy et al 2010).

Performativity flourishes through indefinitely extending and deflecting the criterion of its own success: if an utterance or performative action fails to produce a desired effect, the solution is to reiterate the utterance. Just as audits and failed RCTs are strengthened through their own ineffectiveness, performative operations function through failing to achieve the results they aspire to. They are limitlessly able to profit from their own inefficiencies, much like the “ideal of financial speculation” touted by

those responsible for the recent financial crisis is a mode of speculation that “can only increase possibilities for profit but never break down in the face of an external limit” (Butler 2010: 153).

This point leads to Butler’s overarching concern with performativity as it has been framed by economic sociologists: their inability or refusal to think through the *value* of particular performative actions. Rather than merely ask *how* economic actions are made, or how certain effects are instituted, she maintains that we need to reintroduce normative questions into the theory of performativity, examining not simply whether operations of performativity succeed or fail, but whether they ought to have succeeded or not (Butler 2010: 154).

To be sure, some of Butler’s concerns have been considered by the very theorists she suggests have neglected them. For one, it would be implausible to suggest that performative perspectives in economic sociology are narrowly instrumental or positivist in their orientation, concentrating on the *how* and ignoring the *why*. Neither can these perspectives be called technocratic, as if they would only allow for technical failure, but not for moral or political ones. The performative concept of the ‘market experiment’, such as that adopted by Callon, precisely *rejects* any neat division between between the ‘falsifiable’ ‘empirical content’ of market devices and experiments and the more fundamental, or ‘transcendental’ framing assumptions, and implies a critique of the distinction between their economic or technical and their moral or political aspects. (We could say that this is the Duhemian legacy traceable in

the concept of experimental markets.⁸) The performative sociology of markets precisely offers an alternative to the distinction between instrumental problem-solving within the frame of the market, and a transcendental critique that stands outside it. Rejecting any neat distinction between the inside and outside, the content and context, of market experiments, these perspectives propose that the problematization of market arrangements - the objections, bugs, challenges, critiques, or ‘issuefications’ (Marres and Rogers, 2008) - are likely to be at once technical, moral and political, and are part of the experiments called markets.

The performative definition of the market as a platform of problematization, then, internalizes the enactment of accountability, controversy and critique by regulatory agencies, NGOs and social movements, in an inclusive conception of ‘performing post-market arrangements.’ However, Callon’s framing of post-market arrangements in experimental terms can nevertheless be seen to exclude consideration of certain modes of failure. Take, for example, “Civilizing Markets,” the title of his recent exploration of carbon markets. At first glance, this title brings to mind Albert Hirschman’s discussion in *The Passions and the Interests* of the way that moral acceptance and regard for capitalist markets first grew out of the hope, generated in the 17th and 18th centuries, that markets might tame the volatility of political states exacerbating political instability and conflict due to a blind focus on national self-interest over pursuing collective economic stability. Modern capitalism emerged as an antidote to modern political strife (see Miller 2009, Hirschman 2003, Fourcade and Healy 2007). But Hirschman is not mentioned in Callon’s piece; there is little explicit

⁸ In this respect, the performatist analysis of market experiments does *not* fit with a classic liberal democratic epistemology according to which empirical forms of accountability validate the idea that problem-solving by experts is the central operating dynamic of democracy .

discussion of moral and political problematizations of markets in social and political theory in his own account, even as he includes these kinds of problematization in his empirical definition of markets. Could we say that critique is here empiricised to the point that it comes to resemble problem-solving? Does a belief in 'market meliorism' risk reinstating the very distinction between instrumental and transcendental perspectives on the market which performative perspectives precisely sought to complicate?

Rather than finding a definitive answer to this question, it seems more important to note the performative phenomenon of labelling (Hacking, 2004) that may be at work here. Calling an arrangement 'experimental' may have the effect of legitimating or strengthening the reality of that arrangement. This phenomenon is especially important to consider insofar as it can be extended well beyond sociology. It may be applied to social and economic commentators on 'market experiments' much more widely, in policy, media and the non-governmental sector. One can think here of aforementioned framing of domestic carbon accounting – which involves the introduction of a mode of regulatory control and economic valuation into the household - as an 'experiment in sustainable living'. This experimental form has been deployed to put predominant framings and enactments of the carbon economy on trial, but it has also been taken up as a way of promoting carbon economy uncritically. This is how a report on another UK experiments in carbon accounting by the Oxford Environmental Change Institute, called *Trialling Carbon Allowances*, justified experiments in personal carbon accounting:

‘..the use of pilots has been more akin to prototyping than to experimentation..’ and that ‘..the piloting process is not so much about experimenting as about exemplifying..’. If exemplifying is an important part of policy adoption, then it is hard to see how PCA could be adopted in the absence of trial studies (Fawcett et al, 2008).

The sociology of public demonstrations (Giraud & Stark, 2007; Barry, 2001) has discussed the cross-over of the experiment into a promotional demonstration. But these cross-overs can also be taken as a reminder that experiments can be defined or labelled in very different ways, as either critical trials or promotional devices. The definition of experiments as devices of problematization is likely to require a critical intervention on the part of social science.

That is, we would like to end this section by considering the implications of our argument for the roles that social research may play in relation to experimental arrangements. If it is indeed the case that experiments are ‘under-determined’ arrangements, in the sense proposed by Duhem, then it may be possible for social science to help determine these arrangements. In studying experiments, social science adds its trace; it can produce variable articulations of these experiments like other practices. This is crucial in view of precisely the under-determinacy of experimental failures. In this context, generative failures may easily go unnoticed and be ignored at the expense of promotional versions of experiments. It must then be the job of social science to attend to these dynamics of failure, both the generative and the entropic ones, and foreground these. Which is also to say, the job of performative sociology

must go further than that of the explication of sub-political mechanisms, i.e. the ways in which the functioning of market devices produces seemingly technical but latently political effects (see MacKenzie 2009).

Performative sociology has a role to play in the analysis and dramatization not only of the technical mechanisms but of their failures in the political, moral *and* technical sense. And this would have to involve a readiness to explore how far it is possible to extend performative perspectives beyond a narrow focus on experimental arrangements in their technical aspect. To allude to a recent article by Peter Miller (2009), drawing on work by Hirschman, we need to examine the consequences of the fluid ways in which ‘private vices’ may have been mistaken for ‘technical accomplishments’, and to the ease with which ‘experimental failure’ could be translated into personal gain.

5. Conclusion

The attraction of an experimental concept of failure, we have suggested, is that it allows us to acknowledge that experiments in political economy may result in failure in a range of different ways. Performative perspectives on markets emphasise the experimental nature of these arrangements, but, as it turns out, these approaches have a ‘problem’ with failure as much as realist, systemic theories of economic crisis do. These perspectives are not very good either at appreciating incidental or contingent failures, as performative analyses of the role of experimental devices in the enactment of political economy are biased towards success. Whereas crisis theory suggests that

only entire systems can truly fail, the performative sociology of markets presents failure as eminently corrigible, to the point that it does look much like failure at all.

In this paper, we have sought to address some of the limitations of performative perspectives by developing a typology that highlights different ways in which market experiments may result in technical failure, regulatory failure, and political failure. To adopt such an approach is to say that we must be more experimental than the performative sociology of markets: we must recognize that the failure of market experiments may take many different forms, and may have very different political and social implications, and therefore may require very different analytic and normative strategies on the part of analysts.⁹ While entropic failure invites us to consider dynamics of the consolidation of authority, generative failure alerts us to normatively productive dynamics of articulation, in which the organisation of novel alliances and issues is the main event. Performative failure, finally, requires us to attend to the normative implications of the designation of initiatives in political economy as (failed) market experiments, by social scientists and other analysts.

Such a typology builds upon and nuances the performative assertion that sociology must move beyond the narrow opposition between instrumental endorsements and transcendental critiques of the market. Our three-fold topology, we hope, provides some suggestions as to how to refuse the choice between these two: between *either* narrow empirical analyses of markets as instruments of problem-solving, *or* wholesale critiques of the market as an ideological regime that cannot be falsified in practice. This is not because we think it is possible to provide a ‘neutral’

⁹ This entails an conception of sociology as an a posteriori forms of analysis (Lash 2009).

account of market experiments. Rather, different type of market experiments and their failures require different modes of empirical and normative analysis. Whereas the aftermath of the 2008 financial crisis compelled an analysis of entropic failure, sustainable living experiments invite an account of generative failure. We suggest that this typology helps to chart a new avenue for avoiding an entrenchment of the opposition between instrumental endorsement and transcendental critique of markets, one that can be distinguished from earlier performative accounts of markets. Rather than a narrow preoccupation with the devices of the market, or fawning rhapsodies over their technical workings, we suggest that what is required is a more nuanced sense of the different types of political experimentalism at work in contemporary political economy.

References

Arena, Vanessa (2010). Reflections on 'Crisis'. Chapter 7. Doctoral Dissertation.

Department of Sociology, Goldsmiths, London.

Arendt, H. (1958). *The human condition*. Chicago: Chicago University Press.

Barry, A. (2001). *Political Machines: Governing the Technological Society*. London and New York: Athlone Press.

Bourdieu P. 1969. Intellectual Field and the Creative Project. *Social Science Information* 8:89-119

Beunza, Daniel and David Stark (2002) "Tools of the trade: the socio-technology of arbitrage in a Wall Street trading Room," *Industrial and Corporate Change* 13 (2): 369-400.

Butler, Judith. "Performative Agency" *Journal of Cultural Economy* 3(2): 147-161.

Callon, Michel. (1980). Struggles and Negotiations to define what is Problematic and what is not: the Sociology of Translation. In K. D. Knorr, R. Krohn and R. D. Whitley (Eds.) *The Social Process of Scientific Investigation: Sociology of the Sciences Yearbook* (Dordrecht and Boston, Mass.: Reidel): 197-219.

Callon M. (1986) The Sociology of an Actor-Network: The Case of the Electric Vehicle. In M Callon, J Law and Arie Rip (Eds.), *Mapping the Dynamics of Science and Technology*. London: Macmillan, pp. 19-34.

Callon, Michel (2009) Civilizing Markets: Carbon trading between in vitro and in vivo experiments. *Accounting, Organizations and Society* 34 (2009): 535–54

Cassidy J. 2010. No Credit: Timothy Geithner's financial plan is working—and making him very unpopular. *March 15*,

Cochoy, F., M. Giraudeau, et al. (2010). "Performativity, Economics and Politics: an overview." *Journal of Cultural Economy* 3(2): 139-146.

Colander, David. 2008. Review, Do Economists Make Markets? *Journal of Economic Literature* 46:720-4

Dewey, John (1991 [1927]) *The Public and Its Problems* (Athens, OH: Swallow Press/Ohio University Press).

Dewey, J. (1998 (1908)). Does reality possess practical character? Repr. in Larry A. Hickman and Thomas M. Alexander (Eds.), *The Essential Dewey*, vol. 1, *Pragmatism, Education, Democracy*. Bloomington: Indiana University Press, 124–33.

Didier, Emmanuel (2009) *En quoi consiste l'Amérique ? Les statistiques, le New Deal et la démocratie* (Paris: La Découverte)

Dratwa, Jim (2003) Taking Risks with the Precautionary Principle, Doctoral Thesis, Centre de Sociologie de l'Innovation, Ecole des Mines, Paris.

Duhem, P. (1906/1982) Physical Theory and Experiment. In *The Aim and Structure of Physical Theory* (Princeton University Press, Princeton): 180-218

Ezrahi, Yaron (1990) *The Descent of Icarus: Science and the Transformation of Contemporary Democracy*. Cambridge, MA: Harvard University Press.

Fourcade, M. and K. Healy (2007). "Moral Views of Market Society." Annual Review of Sociology **33**:

Garfinkel, Harold (1967) *Studies in ethnomethodology* (Englewood Cliffs, NJ: Prentice-Hall)

Gibson-Graham, J.K. (2006) *A Postcapitalist Politics*. Minneapolis: University of Minnesota Press.

Girard, Monique and Stark, David (2007) 'Socio-technologies of Assembly: Sense-making and Demonstration in Rebuilding Lower Manhattan', in D. Lazer and V.

Mayer- Schoenberger (eds) *Governance and Information: The Rewiring of Governing and Deliberation in the 21st Century*. New York and Oxford: Oxford University Press.

Green J. 2010. Inside Man. *The Atlantic* April 2010

Hacking, Ian (2004) Between Michel Foucault and Erving Goffman: between discourse in the abstract and face-to-face interaction. *Economy and Society* 33 (3): 277- 302

Haraway, Donna J. (1994), A Game of Cat's Cradle: Science Studies, Feminist Theory, Cultural Studies, *Configurations* 2 (1): 59-71

Healy David. 2001. The dilemma posed by new and fashionable treatments. *Advances in Psychiatric Treatment* 7:322-7

Hirschman, Albert. 2003. *The Passions and the Interests: Political Arguments for Capitalism before Its Triumph* Princeton University Press

Karvonen, Andrew and Steven Moore (2008) 'Sustainable Architecture in Context: STS and Design Thinking', *Science Studies* 21(1): 29-46.

Kuhn, Thomas (1996/1962) *The Structure of Scientific Revolutions*. Chicago: Chicago University Press

Latour, Bruno (2001) From ‘matters of facts’ to ‘states of affairs’. Which protocol for the new collective experiments?’ Paper prepared for the Darmstadt Colloquium plenary lecture, 30th March.

Latour, Bruno (1996) *Aramis, or the Love of Technology* (Cambridge MA: Harvard University Press)

Latour, B (1993) *The Pasteurization of France*. (A. Sheridan; J. Law, Trans.). Cambridge: Harvard University Press.

--- (1987). *Science in Action: How to Follow Scientists and Engineers Through Society*. (Milton Keynes, Open University Press).

Linhardt Dominique (2007) “*Terrorisme et démocratie en République fédérale d’Allemagne (1964-1982). Essai de sociologie pragmatique de l’étatisation,*” in Tommaso Vitale (dir.), *Alla prova della violenza*, Roma, Editori Riuniti.

Leigh Star, Susan (1991) Power, Technology and the Phenomenology of Conventions: On Being Allergic to Onions, in *A Sociology of Monsters: Power, Technology and the Modern World*, ed. John Law (Oxford: Basil Blackwell): 26-56.

Lezaun, Javier (2007) A market of opinions: the political epistemology of focus groups. *Sociological Review* 55 (2): 130 - 151

Lovell, H. (2007) Exploring the role of materials in policy change: innovation in low energy housing in the UK, *Environment and Planning A* (39): 2500-2517

Lury, Celia (2004), *Brands: the logos of the global economy*. London/New York: Routledge

MacKenzie, Donald (2008) *An Engine not a camera: How Financial Models Shape Markets*. MIT Press, London / Cambridge.

-- (2009) Making things the same: Gases, emission rights and the politics of carbon markets. *Accounting, Organizations and Society* 34 (3-4): 440-455

-- (2004). "The big, bad wolf and the rational market: portfolio insurance, the 1987 crash and the performativity of economics." *Economy and Society* **33**(3): 303-334.

Marres, Noortje (2012) *The Experiment in Living*. In: C. Lury and N. Wakeford (eds). *Inventive Methods: The Happening of the Social* (London: Routledge)

-- (2009) Testing powers of engagement: green living experiments, the ontological turn and the undoability of involvement. *European Journal of Social Theory* (12): 117-133.

-- (2005) *No Issue, No Public: Democratic Deficits After the Displacement of Politics*, Doctoral Dissertation, Universiteit van Amsterdam.

Marres, Noortje and Richard Rogers (2008) Subsuming the Ground: How local realities of the Ferghana Valley, the Narmada Dams, and the BTC pipeline are put to use on the Web” (with Richard Rogers), *Economy and Society* 37 (2): 251-281

McGoey Linsey. 2010. Profitable failure: antidepressant drugs and the triumph of flawed experiments. *History of the Human Sciences* 23:58-78

--- 2007. On the Will to Ignorance in Bureaucracy. *Economy and Society* 36(2): 212-235.

Miller Peter. 2009. When markets and models fail: rethinking risk, regulation and the state. *Risk & Regulation (CARR Magazine)* January 6-7

Miyazaki, Hirokazu and Annelise Riles (2005) "Failure as an Endpoint". In *Global Assemblages: Technology, Politics, and Ethics as Anthropological Problems*. Aihwa Ong and Stephen J. Collier, eds. Pp. 320-331. Malden, M.A.

Mol, Annemarie (2002) *The Body Multiple: ontology in medical practice* (Durham, NC, Duke University Press)

Muniesa, Fabian, Yuval Millo and Michel Callon (2007) Introduction. In *Market Devices*. Michel Callon, Yuval Millo and Fabian Muniesa (Eds.), *Sociological Review Monograph* (Oxford: Basil Blackwell): 1-12.

Muniesa, F. (2007). Market technologies and the pragmatics of prices. *Economy and Society* 36(3): 377-395.

Muniesa, Fabian and Michel Callon (2007) "Economic experiments and the construction of markets", in D. MacKenzie, F. Muniesa and L. Siu (Eds.), *Do Economists Make Markets? On the Performativity of Economics*, Princeton, Princeton University Press: 163-189.

Muniesa F. 2010. The problem with economics: naturalism, critique and performativity *Papiers de Recherche du CSI / CSI Working Papers Series 020*

Pinch, Trevor J. and Wiebe E. Bijker (1984). "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other." *Social Studies of Science* 14: 399-441

Pocock, J. G.A. (2003 (1975)). *The Machiavellian moment: Florentine political thought and the Atlantic republican tradition*. Princeton: Princeton University Press.

Popper, Karl (1963), *Science as Falsification, Conjectures and Refutations*, London: Routledge and Keagan Paul, 1963, pp. 33-39

Power, Michael. 1994. *The Audit Explosion*. London: White Dove Press

--- 2007. *Organized Uncertainty: Designing a World of Risk Management*. Oxford: Oxford University Press

Saunders, George (2001) *Pastoralia*. New York: Riverhead Trade.

Shapin, Steven and Schaffer, Simon (1989) *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ: Princeton University Press).

Tonkiss, Fran (2008) Postcapitalist politics? *Economy and society* 37 (2): 304-312.

Thrift, N. and S. French (2002) The automatic production of space. *Transactions of the Institute of British Geographers* (27): 309-335.

Turner, S. (2003). *Liberal Democracy 3.0: Civil Society in an Age of Experts*. London: Sage.

Wolin, S. (1960/2004). *Politics and vision: Continuity and innovation in Western political thought*. Princeton: Princeton University Press.

Woolgar, S. (2005) 'Ontological disobedience - definitely! {maybe}' in Stephen P. Turner and Alan Sica (eds) *A Disobedient Generation* (Chicago: University of Chicago Press): 309-324

*

Noortje Marres is senior lecturer in Sociology and director of the Centre for the Study of Invention and Social Process (CSISP) at Goldsmiths, University of London. She studied sociology and philosophy of science and technology at the University of Amsterdam, and did her PhD research at that same university, and at the Ecole des Mines in Paris, on pragmatist concepts of democracy in technological societies. She just published a monograph *Material Participation: Technology, the Environment and Everyday Publics* (Palgrave).

Linsey McGoey is lecturer in sociology at the University of Essex. Her research examines the value and usefulness of ignorance in deflecting blame and mobilizing resources within modern liberal democracies. Her work has been published in the *British Journal of Sociology*, *Economy and Society*, and *History of the Human Sciences*.