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## THE POLITICS OF CALCULATION

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# THE POLITICS OF CALCULATION

## Towards a sociology of quantification in governance

DAVID DEMORTAIN

### ABSTRACT

A diversity of modes of quantification in contemporary societies have now been explored, following the path of scholars who inspired this field, such as Alain Desrosières. This introduction to the special issue of the *Revue d'Anthropologie des Connaissances* on the politics of calculation argues that there remains a gap between different strains of the sociology of quantification - one that emphasizes the governmentality it embodies and the discipline it establishes, the other that pays attention to the collective mobilization capacities it offers. It is suggested that public policy and governance is a good field of investigation, to understand how these two “regimes of quantification” are articulated together, and evaluate the extent to which actors external to the networks that control public policies can influence them by recalculating both the problems addressed and the effects of policy programs. Combining the sociology of science and technology and political sociology, this special issue thus hypothesizes that calculation is one of the ways of building coalitions in governance, and one of the objects of what is being debated in its arenas; and, conversely, that governance is one of the contexts in which contemporary forms of calculation are forged and algorithms invented.

Keywords: Quantification, calculation, governmentality, Public policy, governance

### INTRODUCTION

The sociology of quantification, specifically the political sociology of it, has turned into a very rich field of investigation in France, in the path opened by the duly celebrated work of Alain Desrosières (Didier, 2016). This field, so it seems, is entering into a phase of maturation and consolidation. The various journal

special issues, edited volumes and literature reviews published in France and elsewhere testify to this (Bardet & Jany-Catrice, 2010; Bruno *et al.* 2016; Dagiral *et al.* 2016; Diaz-Bone & Didier, 2016; Berman & Hirshman, 2018; Mennicken & Espeland, 2019). They demonstrate the vitality of research in the field, the already recurring results and emerging theorizations, as well as the questions that remain unexplored. Many questions remain, in truth, because of the very curiosity of the people that publish in the field, and because its still young research programs — such as that of Espeland and Stevens (2008) — have not been fully completed yet.

This special issue contributes to the ongoing development of the field. It builds on the observation that there remains a gap between several parts of the field, namely between the literature that approached quantification as a material and political rationality; and another literature that prefers emphasizing that quantification is also a mode of collective action and mobilization. The project shared by the authors that contributed to the special issue is to look at quantification in the context of political action towards public policies and governance, to better assess what political order quantification contributes to establish in contemporary societies. Public policy analysis and the sociology of public action, as known in French-speaking sociology and political science, with its rich analytical language to decipher political games and processes, offer the possibility, it is assumed, to assess whether quantification is a fixed technology of government, that reproduces a power structure, or on the contrary a tool that facilitates political action towards this structure, and its change.

## NUMBERS AS A TECHNOLOGY OF GOVERNMENT

One of the most frequent claims in the sociology of quantification, and generic result of research in this area of the past two decades, is that numbers are a technology of government, and that one may “govern by numbers”. That quantification is the foundation of a capacity to intervene on societies and markets, and govern them, is now well understood. Quantification is a generic technology of government. Foucault trained us to recognize this, and people have subsequently confirmed his vision. Nikolas Rose, for instance, was among the first to explicate how and why “*numbers here are an intrinsic part of the mechanisms for conferring legitimacy on political authority*” (Rose, 1991: 673). With Peter Miller, he argued early on that the political rationalities of government could be captured by looking at the technologies employed — calculation being one of them (Rose & Miller, 1992: 175). More recently, in France, Alain Supiot, a legal scholar specializing in the sociology and history of law, has argued that numbers have replaced the law, as the main technology of government (Supiot, 2015). Putting things in numbers, establishing quantitative objective, the continuous

and imperative adjustment of behaviours to numbers, to meet these objectives – all of this has taken the place of a former mode of government and legitimacy, based on the negotiated and transparent application of the rule of law.

The notion of a government of or by numbers is rooted in decades of historical, political and sociological investigation. Research has helped showing, among other things, that quantification is a form of expertise, hence power. It is a sort of knowledge that is deemed credible and authoritative. A government of numbers give power to those professional groups that have the legitimacy to collect, frame and interpret data, and who master the operations of classification, standardization and aggregation by which credible numbers are made. Those groups contribute to the power of the state — most concretely of large public bureaucracies (Espeland & Stevens, 2008: 411) — to deploy large apparatuses to collect information systematically about people, territories, and social and economic life.

Quantification helps govern, because it restricts the frames for expressing or articulating issues, defining public problems and putting them on the governmental agenda. Quantification constitutes certain phenomena in objects of government, but gives these phenomena a standardized form. Set categories and rubrics are established, which serve to produce information in a systematic way, but restricts the expression of meanings attached to these phenomena. It circumscribes the possibility to discuss certain issues, and the possibility to recognize new problematic situations, until they become tangible in the standard statistical tables and indicators that the state chooses to follow and monitor. Quantification, in this regard, is a way to manage unruly publics. It enhances the governability of societies and social groups, by excluding a wide variety of local issues and concerns from the set of problems that governments administer. The sociologist Ida Hoos, investigating the rise of methods of quantitative systems analysis in the US government<sup>1</sup> in the 1970s (Thomas, 2015), deplored what she called a *quantomania*, spreading across nearly all sectors of public administration: “What cannot be counted simply doesn’t count, and so we systematically ignore large and important areas of concern. On the other hand, we sometimes conjure numbers out of assumptions so that we can make calculations. Once included, they become ‘hard data’, easily to be confused with ‘facts’” (Hoos, 1979: 193)

Much like other technologies of government, indicators, ratios or statistical tables, are in appearance only technical. They are owned, in fact, by professionals and specialists. They are designed and run “outside the spaces of democracy” (Lorrain, 2006, p. 429). They remove their moral and ideological character from the problems addressed, depoliticize them (Ogien, 2013; Rose, 1991). Their use and outputs are imposed onto the governed. They establish a material, undebatable relationship between them and those who govern (Rose

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1 A method founded by physicists and economists, inheriting from war-time operations research, that consists in categorizing various things as systems (health, the city, politics), theorize its functioning, quantifying and optimizing its state.

& Miller, 1992; Lascoumes & Le Galès, 2005). They perform the authority of the State, as people, collectives or organizations are enrolled into these dispositifs, and abide by the rules of collection of information as well as by the resulting numbers. For Espeland and Stevens, echoing Foucault, it is for this reason that one can argue that “*Quantitative measures are a key mechanism for the simplifying, classifying, comparing, and evaluating that is at the heart of disciplinary power*” (Espeland & Stevens, 2008: 414).

In more recent literature, this disciplinary effect has been linked with the authority gained by the ideology of the market. Not that of systems, or that of risks, but that of the comparative measurement of costs, benefits and efficiency (Boudia, 2014). Quantification comforts certain logics of government and management, the first of which being a logic of managing administration according to its financial efficiency. Quantification, thus, is closely associated with the expansion of neoliberal schemes of thought in government (Halpern *et al.*, 2014). This is an expression of the fact that price, cost and monetary value functions, in our societies, as the main way of measuring, and of making things commensurable. It is, one may say, a dominant metric, that has colonized worlds that one would thought, were incompatible with these criteria and scales. The example of cost-benefit analysis in environmental matters, is one of the most striking examples of this redefinition of policies aimed at qualitative, unstructured phenomena (Kysar, 2010). Healthcare is another blatant example: it has been remodelled as the product of a “system” by influential health economists (Serré, 2002); a system which one could manage and optimize according to aggregate levels of demand, supply, cost or price; one in which one could micro-manage organizations, professionals and patients, so that they conform to what is best for the system (Juven, 2016).

In sum, the drive to put things in numbers and govern society according to what agreed-upon numbers indicate, goes unabated. It reaches into more and more areas of social life, work, and government (Bardet & Jany-Catrice 2010). Although no unifying logic may be at work, most of what is going on can be related to a “neoliberal governmentality”, aptly captured by Alain Desrosières:

“The neoliberal state capitalizes on microeconomic market dynamics, steering them, in part, through systems of incentives, endorsing the central assumptions of rational expectation theory [...] Microeconomic models allow separating and insulating the specific effects of particular variables or tools of government on their performances, in view of improving the target variables, that constitute the true objectives of these incentive-based, and behavioural policies” (Desrosières, 2012: 273).

The disciplining of individuals is effectuated by putting forward quantified good practices, and appropriate behaviours — benchmarking —, to which numbers provide natural authority (Bruno & Didier, 2013). Individuals are called to participate to that discipline, by self-quantifying their actions, and comparing their numbers with that of others. This neoliberal quantification, in practice, models behavior (Miller, 1992).

## QUANTIFICATION, MOBILIZATION AND THE RULE OF DEMOCRACY

One question remains, however, concerning the nature of the political order which quantification comforts or performs. The hypothesis that is most commonly shared today is that the logic of numbers partakes in the expansion of a market logic, and a neoliberalization of societies and of their government. It legitimizes and facilitates the institutionalization of financial optimization and its tools in the government of societies and in public services.

Now, quantification does not necessarily follow the same logic everytime and everywhere (Dagiral *et al.*, 2015). To fully appreciate the political order that quantification establishes, and whether numbers are responsible for this alone (Salais, 2016), one needs to bring into dialogue the literature on the government of numbers, or governmentality, and another, as well-developed literature on quantification as a mode of collective action and mobilization. According to the literature review offered by Andrea Mennicken and Wendy Espeland, quantification is as often studied as a democratic mechanism. It is, in this guise, the foundation of another quantification regime, distinct from that of the government of numbers. In parallel with the claim that numbers institute a capacity to govern, and comforts the power of experts and bureaucracies, the sociology of quantification has come to argue that quantification

“is often driven by the desire to hold to account, to counteract despotism and arbitrariness, and to make visible social and economic inequality. Numbers have come to be integral to how democracy is justified and operationalized as a particular set of mechanisms of rule” (Mennicken & Espeland, 2019: 224).

Numbers “*can also aid social mobilisation and critical debate*”, and even re-politicise issues that had disappeared from the public and governmental agendas (Kurunmäki *et al.*, 2016: 395). Alain Desrosières, in his time, spoke of the progressive relation to statistics and public numbers, which he construed as a “*weapon at the service of democracy*” (Desrosières 2012: 263), just as Ted Porter showed through his referential historical study of statistics and cost-benefit analysis as tools of transparency and trust in the US government (Porter, 1995).

Mennicken and Espeland refer, to illustrate this regime of quantification, to the adaptation of statistical apparatuses to make minorities visible, and contribute to the formation of the political identity of groups labelled minorities according to large national statistical aggregates (Mora, 2014; Rodríguez-Muñiz, 2017). The social movements that defend quality of life, environmental protection or the health of particular groups, often work in a similar fashion, to not just build stories, but also to generate alternative indicators that might reveal the extent of the problem. Early illustrations of this are the movement for alternative social indicators, quantifying human development, gender equality

(or the lack thereof), social progress and quality of life (Land, 1983). But what students of environmental mobilization have termed “popular epidemiology” (Brown, 1992) — or how groups of non-professionals and citizens engage in the production of quantitative knowledge about toxic wastes and associated diseases — would also qualify, as well as the “social impact assessment” movement (Freudenburg, 1986).

Mennicken and Espeland formulate several propositions, to advance research on quantification and democracy and clarify the extent to which people resist quantification and its discipline, or subvert and appropriate it for other political enterprises — a question on which the literature remains ambiguous (Bardet & Jany-Catrice, 2010). The suggestion is to study: “public participation and inclusion of local knowledge in (uncertain) indicator design, including classification, measurement, and aggregation”; the development of alternative measures and counter-quantifications; the role “numbers play in generating and framing public discussion and deliberations about public goods such as higher education, poverty, sustainability, migration, incarceration, and health”, and a variety of other public goods (Mennicken & Espeland, 2019: 232-233).

This program echoes some of the research that has been performed in France under the banner of “statactivism” (Desrosières, 2012), or the use of quantification and measurement as a tool for deliberation and emancipation. The various chapters of the eponymous edited volume (Bruno *et al.*, 2015) echo what Neveu saw as a radical change in the repertoire of action of social movements and interest groups (Neveu, 2015) — calling upon numbers, and the scientific language and the register of facts and objectivity more generally — and Ihl an “intensification of scholarly activism” (Ihl, 2004, p. 406). They also resonate with research on public policies, which demonstrate how public interest groups and non-governmental organizations, in an international context, succeed in both gaining a place in the arenas of power, and putting new issues on the agenda, after quantifying it thanks to creative, and credible, indicators (Aubert *et al.*, 2016; Gaidet & Fouilleux, 2018; Milet 2005; Revet 2015). In short, those who fight for the recognition of new problems, do use numbers and indicators (Bezès *et al.*, 2016). Quantification, in this sense, partakes in the construction of public problems, as Gusfield showed (Gusfield, 1981; Stone, 1989).

## **BETWEEN GOVERNMENTALITY AND PLURALIZATION OF GOVERNMENT**

The aim of this special issue to advance the combined discussion of governmentality and collective democratic action through numbers. What exactly is the relationship between quantification, government and democracy? If quantification simultaneously, is a technology of government, and a tool that enables

dominated groups to gain influence over governmental agendas and policies, how could one characterize its overall political effect? Does quantification partake in the expansion of disciplinary power of existing institutions, or does it preserve, even augment, pluralism in governance, and the diversity of actors that wield influence over governmental action?

To date, authors in the field have seldom tried to explicitly combine the various perspectives of quantification. For Berman and Hirschman, who offered another review of the whole field of study of quantification (Berman & Hirschman, 2018), “the sociology of quantification is still very far from having general claims or a common theoretical language” (Berman & Hirschman, 2018: 258). Mennicken and Espeland are not far from arguing the same thing: the study of quantification is still fragmented, and lacks the structure of a proper field of studies. Students of quantification enlist in research about one or the other regime of quantification — administration being one, democracy another.

The literature on quantification, thus, has not yet produced, or perhaps tested, whether the aggregate political effect of quantification, so to speak, pertained to governmentality, discipline and control in the administration of societies, or to capacities of collective action and democratization. Many of the seminal authors of the field juxtapose these politics, but do not really tell readers how they assemble (Rose, 1991; Desrosières, 2014; Bruno *et al.*, 2016). This may be a result of the inspiration of Michel Foucault, who argued that one was the other, and vice versa. For Foucault, governmentality is not pure discipline, or subjection of the individual. Inherent in governmentality is a dialectic of constraint and capacity. The apparatuses and instruments that materialize the rationalities of government, both constrain and enable individuals. They “generate strategic stakes, who in turn make the power relationships that they are supposed to institute, unstable and reversible” (Foucault 1984: 584).

Still, it may be worthwhile investigating quantification, bearing in mind what each of the spectacles may produce looking at the same object, and trying to harmonize the picture. Further research is key, first, because new technologies of data collection and computation emerge, whose effects are unclear. Desrosières argued that each technology of quantification corresponds to a type of state, and a particular historical period. It is well worth perpetuating this approach, as new technologies emerge, and as politics is becoming, overall, digitalized (Ogien & Laugier, 2017).

But the main to study government and democracy (or collective action and mobilization for that matter) by numbers in a combined way, is that the relationship between these different contexts or regimes of quantification remain obscure. To date, it looks like a paradox. Aykut and Nadai (this special issue), for instance, note that the rising use of predictive models in public policies, can both be the sign of the endurance of technocracy, or of a new form of reflexivity and opening of governance. So, if technologies of quantification frame, silence problems and publics, and thus order governance, what then is the effect of the resistance to these technologies and, further, of the appropriation

and reinvention of quantification by the governed? To what extent does quantification change the way in which policies are formed, negotiated and implemented? How far do interest groups, associations, trade unions, moral entrepreneurs, or else, succeed in coproducing public policies, thanks to the political resource of quantification, data or calculations on them? Is the invention and use of indicators, ratios, models and calculations by the varied set of actors of the governance of public problems best approached as a resistance to government, without effect on the rationality of government being deployed and the structure of established powers? Is it a form of marginal adaptation to the use of numbers of these powers? Or does it affect the structure of relationships between these very powers and the actors with which they negotiate policies?

## MAKING POLICIES THROUGH CALCULATIONS

So, in the simplest possible terms, some questions remain about the politics of quantification: what do numbers change, overall? “*When and how do numbers matter?*” (Berman & Hirschman, 2018: 258). The papers collected here do two things, to attempt to make strides on this front.

One is to look at quantification in practice and in action, notably at the level of calculation. Desrosières used to argue that quantifying is agreeing on what to measure and how, and then measuring (Desrosières & Kott, 2005; Desrosières, 2008a; Desrosières 2012). Despite the usefulness of this phrase to clarify what quantification means, terms continue to vary from author to author. Various terms are used interchangeably, or as a litany, including standardizing, normalizing, categorizing, counting, measuring, quantifying, calculating... More and more often, these terms are organized as a suite of social operations. For Callon and Muniesa (2003), quantification has as its final step the “extraction of a result”. Mennicken and Espeland (2019) define a set of three operations — classification, control and aggregation — of which the third seems to stress what people do with numbers, putting them into relations, producing new quantities as a result. Stressing these operations, particularly these final operations, means looking into how these are designed and operated, deposited into what is now commonly called algorithms, seeing the effects of the original numbers that are produced, and thus approaching quantification as a practice, and form of agency.

The second dimension in this special issue is the policy dimension. Public policy analysis and governance research in general offers rich, subtle tools to analyse how problems are governed and administered, and which actors has power of which part of these processes, overall (Hassenteufel, 2011; Genieys & Hassenteufel, 2012). Public policy-making and governance is the ideal ground

to investigate the questions described above, and make the departure between disciplinary and emancipatory effects of calculation.

The study of calculation is inspired by science and technology studies. What the papers in this special do is to cross-fertilize it with the study of public policy and governance, assuming that there is a two-way relationship between acting on and through calculations — elaborating data, infrastructures and algorithms to produce facts — and the socio-political organization of policy-making actors (Baumgartner & Jones, 1993).

## CALCULATING COALITIONS

What the papers of the special issue have in common, is to show that the calculations that used in the formulation and implementation of policies are formed by particular coalitions, which they help form and lend influence to. The establishment of a database, and design of an algorithm to produce a given ratio, indicator, or discrete number, are operations through which heterogeneous actors assemble and come to act in a coordinated manner. Much like the advocacy coalitions conceptualized by Sabatier share beliefs (1988), these groups share assumptions about the virtue of the numbers that they produce, and of the methods that serve to generate them. They use those to articulate problems, or advocate policies. As just hinted, these coalitions gather heterogeneous actors. They may bring together administrative actors, and other actors who act outside the administrative sphere. Experts or specialists of numbers and of their calculation act as brokers, and stabilize the coalition.

In this special issue, Stefan Aykut (Université de Hamburg) and Alain Nadai (CNRS, Centre International de Recherche sur l'Environnement et le Développement) deal with the development of models to compute the effects of choices of energy sources and modes of consumption, as well as the deliberation around energy policy scenarios that these computations support. Computational models, research has already shown, are not simply helping to predict situations from the outside of government, and bring numbers on the table of policy-makers. They are designed and run according to assumptions and visions that betray the modellers' close involvement in the world of policy-making, and their ambition to shape policy action (Kieken, 2004). It is because of this intertwining of modelling and policy, that models and simulations are somehow performative (van Egmond & Zeiss 2011; Upham *et al.*, 2015). Public interest groups and associations that contest climate or energy policies use this means to influence public policies. They can engage in modelling to produce alternative simulations, and make other policy developments credible. Here, Aykut and Nadai illuminate the historical process by which models and scenarios for energy policy have diversified over time, owing to the ties between environmental activists and certain corners of the economics and

of the environmental engineering discipline. They observe the rise of a policy assemblage, involving these activists, modelers, particular visions of desirable energy futures, and tools and data to make these visions actually tangible and debatable.

Sylvain Parasio (Sciences Po) et François Dedieu (INRA, Laboratoire Interdisciplinaire Sciences Innovations Sociétés) show what citizen measurement of air pollution owes to the existence of an unlikely coalition, comprised of the heads of local environmental movements, academics and members of the state's environmental protection agency. This coalition is technical, and works to forge credible and exhaustive measures of air pollution. The coalition helps to satisfy the necessarily standardized nature of air pollution monitoring (necessary to create state-level of indicators, and compare the situation of various territories), and the need to have in-depth, and meaningful data that document the situation of particular communities and locales. This coalition is also a political coalition. It helps the state environmental agency deploy the environmental justice policy it has pledged to advance, academic epidemiologists to work towards health protection, and local activist to defend their people against the leaders of their county, with whom they are in conflict.

The article authored by David Demortain (INRA, Laboratoire Interdisciplinaire Sciences Innovations Sociétés) recounts the history of the development and application of a technique to model the effects of chemical substances on the human body. This technique of Physiologically-Based Pharmacokinetics (PBPK) is accused of favouring the interests of the chemical industry: being designed to replace the safety factors that regulatory agencies apply to compute safe doses of chemicals, they mechanically lead to increase these doses of reference. The decisions that regulatory agencies take based on these models do not appear to confirm this bias. They nonetheless show that this particular way of computing the doses of chemicals is inseparable from the rise of a more collaborative mode of governance of chemicals, allowing a direct and close involvement of businesses and allied scientists in the definition of the right ways of evaluating chemicals and their risks. The paper also shows that an alternative modelling technique and algorithm — for quantitative uncertainty analysis — has taken root in regulatory processes, as regulatory agencies have coalesced with another family of modelers, more oriented towards the protection of public health.

Vincent-Arnaud Chappe (CNRS, CEMS) introduce us to the arcane conception of indicators to measure social and gender inequalities within companies. He focuses on the "*rapport de situation comparée*", a form of social reporting that every business of more than 50 employees in France must produce, to show the extent of inequalities among its workers. This report comprises a series of indicators, that have been designed – and negotiated – by the relevant administration, trade unions and business associations. Chappe traces the history of the shifts that trade unions, in coalition with a fringe of academics, either sociologists or economists, as well as gender activists, have worked to impose to

the gender inequality indicators negotiated in the statutory *Conseil supérieur à l'égalité professionnelle* (CSEP). In so doing, he shows how trade unions, at the centre of this coalition, gain a capacity to work within the constraints of the existing legal and statistical infrastructure, employing existing categories and data to compute numbers that are more likely to reveal inequalities.

Mehdi Arrignon (AgroParisTech, Laboratoire PACTE) closely investigates the way in which the French Commissioner for social affairs, during the presidency of Nicolas Sarkozy, set out to employ the method of the randomized clinical trial of economists, to produce the evidence of the efficiency of an innovative but contentious reform – the introduction of incentive-based system of social benefits for unemployed (*Revenu de Solidarité Active*). Against a purely tactical reading, Arrignon shows that the Commissioner and his advisers have teamed with economists in a genuine attempt to apply this standard method, convinced as they were that it would prove its efficiency. The policy reform, in this respect, is inseparable from the credibility of the method, and the provisional, yet effective coalition that it gave birth to, linking the Commission and his advisers to renowned economists and other elected officials (heads of French *conseil généraux*), on which the experiment depended.

## POLICY ARENAS AND THE EVALUATION OF NUMBERS

One final theme emerges from the contributions to the issue: each of them shows in their own ways, that the evaluation of numbers and of underlying formulas, are a central element of the politics of policy-making. To put it simply, numbers and formulas are seldom accepted as such, but trialed, deconstructed and debated, often publicly (Andrews *et al.*, 2017; Crawford, 2016).

Aykut and Nadai put at the heart of their history the particular, provisional policy arena of the *Debat National sur la Transition Energétique*. This arena, in fact, is almost defined by the existence of an ecology of models and scenarios. The comparison and confrontation of these models is the *raison d'être* of the debate, the very institutional motivation to establish it, and its way of working. At the heart of the deliberation taking place on this stage, one finds the minute examination of models, assumptions, parameters, and strength of their resulting numbers. In Parasie and Dedieu's case, local arenas, including local media arenas, play an essential role. Official measurements of air pollution are trialed there, accused of overlooking localized pollutions and the problematic levels of exposure of particular groups and neighbourhoods. In Demortain's case, calculations appear to be put in debate in a variety of interconnected public arenas – the national academies, the press, the judiciary, which open to the various voices that support or contest the numbers and algorithms on which decisions rest. The paper by Chappe is also a direct illustration of the joint political life

of calculation and of arenas: his is a story of the negotiation surrounding indicators that trade unions and their allies have manufactured for the arena of the CSEP, in which they will get tested, perhaps endorsed. In the work of Arrignon, numbers and calculations get debated and judged in the parliamentary arena, among others, at this crucial moment where the Commissioner introduces the results of the experimentation to members of parliament hastened to vote his reform.

Calculation, at the end of the day, does appear to be a mode of action on policies, and an integral component of the repertoire of a set of actors that engage with these policies — as much as a technology of government. It has become, too, one of the normal materials of the politics of policy-making. So, calculation is not necessarily a fixed instrument, reproducing the structure of powers and the relationship between governing actors and those governed. It would obviously be exaggerated to argue that, with quantification and calculative operations, come a full pluralization of governance, and the rise of the influence of actors that are peripheral to the policy sub-systems that usually control them. In truth, the papers that are brought together here call for nuance: the appearance of coalitions and of new ways of calculating pollution, inequality, chemical risks, or energy futures or rates of return to work of unemployed people, takes place during moments of reform of the policies in question. Though we are far from configurations of outright policy crises (Dobry, 1986), all of the policies surveyed here are fluid, and the systems taking care of them, partly open to external influences. The pluralization of numbers and algorithms that is observed in the various papers, probably has to do with these contexts of change. But then again, it is useful to think about calculation and policy as being in a recursive relationship: the perceived possibility to quantify things differently, or quantify other things, spur action, which in turn contributes to destabilize policies, and keep windows of change open. The extent to which the numbers and algorithms that are suggested during this moment, win the day and institutionalize into a material system, complete with its categories, procedures of data collection, cadres of statisticians and calculators, is a further question that, from the perspective advocated here, would be well worth investigating.

## **MOBILIZING THE EXPERTISE AND INFRASTRUCTURES OF CALCULATION**

Each of the contributions shows, in a sociological coproductionist perspective as it were (Jasanoff 2004), that ways of calculating and the social organization of policy formulation, mutually influence each other. New forms of calculation and new computations about public issues, help replace certain actors at

the centre of the political space in which policies are formed, thanks to the alliance that these numbers help form.

This comes in contrast with governmentality studies, that broadly show how the expertise of numbers and calculations, replace the authority of those who were in charge, inside public administration, of the quantification of issues. Desrosières was specifically worried that, under an era of neoliberal governmentality, the cadres of public statisticians and economists would be replaced by the specialists of benchmarking and rankings (Desrosières, 2012; 2014). A similar concern emerges today, as the digitalization of many aspects of life, and the capture of data by large commercial platforms, displaces power from public experts of statistics, to faceless computers of personal data (Davies, 2017).

There are unmistakable signs of this trend in various areas of governmental work and public services. The production of new numbers, and predictions, thanks to more numerous and more fine-grained sets of data, help private experts enter into areas of public action where they were absent. Under the banner of data science, new types of experts are thus entering legal systems and policing (Christin, 2017; Benbouzid, 2019). As administrations consult new kinds of data providers and modelers, the professional groups and experts in place can be severely challenged, or displaced outright (Angeletti, 2011, Henriksen, 2013).

The papers included in this issue do not directly address the issue of the redistribution of expert power linked to the emergence of new types of information and analytical technologies, but one can infer from these studies that the rotation among experts may be less dramatic. They show, collectively, that there remains a degree of fluidity in the ways of putting policy issues in numbers, and that calculatory expertise is in some sense distributed. Different actors work to produce and validate numbers, from within administration or outside. What is observed in this handful of cases is less the replacement of a professional group by another, and the displacement of the statistics produced by public administrations by private producers of data, than a reconfiguration of the alliances between actors that offer numbers, and others. These reconfigurations are facilitated by the contexts of reform and change in policies. The movement goes both ways: these coalitions are enabled by new numbers and methods to compute them; in turn, they make these ways of producing numbers evolve.

The fact that coalitions and arenas of calculation emerge is still puzzling, however, given the materiality and stability of the infrastructures that produce the data that actors who wish to calculate, need. Quantification is a form of governmentality because it rests on material infrastructures and on the standards that command the production of formatted, homogenous data (Espeland & Stevens, 1998). Those infrastructures constitute a good part of the discipline that Foucault wrote about. They modify people, places and things. They require their participation, or even “complicity” (Espeland & Stevens, 1998, p. 331). They constitute people as agents of data systems, and make them governable.

They allow states and firms to produce decisions routinely, about these people. They are most of the time invisible, even if they require immense, continuous coordination work to be established and function (Bowker & Star, 1999).

Each of these motives — legitimacy, functionality, coordination costs — explain why informational and data infrastructures can not multiply, or be easily altered to quantify something else. This simple fact is a barrier to the emergence of coalitions defined by alternative ways of counting and calculating. The papers in the issue provide an important element of explanation, for how coalitions nonetheless emerge, and calculation gain in diversity. It relates to what one may term the accretion of infrastructures. The coalition and alliances that are observed here do not solely contest existing infrastructures, or construct alternative databases, using new categories and standards. They plug on existing infrastructures, and deviate them. They use these as much as possible, observe their limits, and find ways of completing the infrastructure. They add parameters, informational items, or most importantly, develop formulas to produce new results based on the same data. Aykut and Nadai are most explicit about this dimension, when they show that new models and scenarios develop on the basis of the limits of former models, and because existing infrastructures allow new types of data to emerge – namely, energy consumption data (see also Aykut, 2019). Parasie and Dedieu speak about the politics of calibration, to show how the existence of other data, and associated collectives, is due to their capacity to align on the existing, official infrastructure, and apply the standards of measurement that define it. In Demortain's case, PBPK models, as an alternative mode of computing hazards and doses of chemicals, only exist because of the underlying sets of data produced through animal experiments. Models are data models in the first place, and could not exist without this vast infrastructure for standardized animal experimentation, that modellers nonetheless criticize and aim to replace. Chappe, finally, is very explicit on this very point of the connection to existing infrastructures. The action of trade unions and their allies only makes sense because they are legitimate users of the data produced by businesses, and are able to recompute them.

So, the discipline of quantification has its legitimacy. This legitimacy is linked to the capacity to commensurate things, and produce objective measures of things that are alike. One cannot easily counter-quantify without risking to be illegitimate, and less objective. Acting through calculation to shape policies does not involve the contestation of existing categories, data and standardized infrastructures in place, but help them grow and evolve, from within. There are margins of maneuver inside infrastructures, and calculations using already existing data, by actors who have access to these even though they don't own the infrastructure, only accentuates and exploits these.

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