
1. Introduction

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A NEW DIRECTION IN POLICYMAKING THEORY AND PRACTICE?

The aim of this Handbook is to improve the theory and practice of policymaking by drawing on the theory, concepts, tools and metaphors of complexity. In both theory and practice, the key aim is to advance ‘complexity thinking’, which describes a way to understand and explain the policymaking world, act accordingly, and invite others to do the same. To do this, the Handbook brings together a wide range of specialists to address these issues from different angles: disciplinary specialists examining how complexity thinking influences the study of topics such as the law, philosophy and politics; interdisciplinary teams examining how best to model or describe complex systems; case study specialists explaining the outcomes of real world events; and scholars and practitioners examining how to ‘translate’ complexity theory into ‘simple’ policymaking advice.

This is an ambitious project which applies a new theoretical approach to the philosophy, methodology and real world case studies and practice of politics and policymaking. Its ambition is in keeping with the approach of many well-established complexity theorists. It is common in the complexity theory literature to make bold claims about its novelty, reach and explanatory power: to say that it is radically new; a scientific revolution that will change the way we think about, and study, the natural and social world.

Yet it is not necessary, or sensible, to reject the past in such a wholesale way. Rather, we feel that complexity builds on earlier traditions and bridges many others. In theoretical and empirical studies, the identification of complex systems (and associated behaviour and outcomes) may further aid our understanding of policymaking and help select the most useful methods of study. In normative studies, it may add weight to a well-established focus on topics such as the unintended/ adverse consequences of ‘top-down’ policymaking.

To clarify these points we will briefly discuss some of complexity theory’s main features (particularly relevant to policy) and explore how much is really new. Following this, we outline the basic structure of the book and provide brief chapter reviews. The book is divided into three main parts:

- Theory and tools;
- Methods and modelling for policy research and action;
- Applying complexity to local, national and international policy.

As with any edited book, not all of the chapters fall into exact categories. Most of the chapters are a mix of theory and application. Moreover, we tried to make the Handbook as wide-ranging and accessible as possible. Hence, there is no single unifying policy area or theme running through the chapters. We are well aware that editing a large volume

is like trying to manage a loosely structured complex system. We had a clear idea of the direction in which we wanted to go and the type of book we wanted to see, but the exact nature of each of the chapters involved a range of unpredictable developments and interactions. Nevertheless, we are very pleased with the result and hope that you agree.

COMPLEXITY THEORY'S MAIN FEATURES

Advocates of complexity theory describe it as a new scientific paradigm providing new ways to understand, and study, the natural and social worlds (Mitchell, 2009: x; Mitleton-Kelly, 2003: 26; Sanderson, 2006: 117). Its point of departure is 'reductionism', or the attempt to break down an object of study into its component parts. Complexity theory suggests that reductionism is fatally flawed because complex systems are greater than the sum of their parts. Elements interact with each other to produce outcomes that cannot simply be attributed to individual parts of a system. Consequently, it suggests that we shift our analysis from individual parts of a system to the system as a whole, as a network of elements that interact and combine to produce systemic behaviour. The metaphor of a microscope or telescope, in which we zoom in to analyse individual components or zoom out to see the system as a whole, sums up this potential to shift our focus and approach.

The potential reach of complexity theory is remarkable. It is described by its advocates as a way to bring together the study of the natural and social world – by identifying the same broad features in each object of study and, as far as possible, using the same understanding and methods to study markedly different phenomena. Complexity theory has been applied to a wide range of activity, from the swarming behaviour of bees, ant colonies, the weather and the function of the brain, to social and political systems. The argument is that all such systems have common properties, including:

1. A complex system is greater than the sum of its parts; those parts are interdependent – elements interact with each other, share information and combine to produce systemic behaviour.
2. Some actions (or inputs of energy) in complex systems are dampened (negative feedback) while others are amplified (positive feedback). Small actions can have large effects and large actions can have small effects.
3. Complex systems are particularly sensitive to initial conditions that produce a long-term momentum or 'path dependence'.
4. They exhibit 'emergence', or behaviour that results from the interaction between elements at a local level rather than central direction.
5. They may contain 'strange attractors' or demonstrate extended regularities of behaviour which may be interrupted by short bursts of change (punctuated equilibrium).

Since complexity is a theory of many things, the language is inevitably broad and often vague. It is not always clear why we would want to compare potentially similar processes in the natural and social world, or why scholars would collaborate to do so. There are some visible tensions in the field regarding what complexity theory is, what its terms mean, how it can be used to explain outcomes and which theorists are most worthy of study (Cairney, 2012: 354; Paley, 2010).

At the very least, complexity theory needs some interpretation in each discipline or field. That interpretation process may be usefully done by interdisciplinary teams, each conscious of their own terms and biases. Or, single disciplinary studies may produce distinctive contributions to complexity thinking. For example, consider the idea of ‘emergence’ in the absence of central direction. This may be a straightforward idea if we are studying single cells interacting to produce outcomes in the absence of a central brain. The interaction may follow simple rules, but the rules are determined locally and without reference to a wider ‘order’ determined by a central, rule-making body. This is not a straightforward idea in politics and policymaking, where the ‘centre’ (usually central government) exists and sets many rules for local actors to follow. In this context, ‘emergence’ may refer to behaviour which results from local interaction *despite* central government policies or rules, not in their absence. It is more difficult to explain outcomes with reference to local actors who interact with each other (and their environments) with no reference to, or awareness of, attempts by the centre to produce a different kind of outcome or order.

In broader terms, we should be careful about comparing the natural, physical and social worlds – at least unless we are content with: (a) the use of complex systems simply as metaphors with no direct source of explanation (as is common with studies using terms associated with evolution); or (b) the same use of mathematical terms and formulae, to maintain the same level of abstraction when producing explanations. This is difficult to do in studies of the social world, where there is greater potential to ‘psychologize’ processes such as attraction, order and self-organization to produce explanations with no equivalent in the physical world (Paley, 2010; 2011).

Even in the absence of this tendency, we need to consider how our objects of study differ and how we should respond. Human behaviour, or ‘the capacity to reflect and to make deliberative choices and decisions among alternative paths of action’, makes the social world an unusual object of study (Mitleton-Kelly, 2003: 25–6; see also Padgett and McLean, 2006: 1464; Steinmo, 2010: 13). In particular, it makes it difficult to follow studies of the physical systems which produce ‘deterministic’ arguments: ‘if the complex *system* is predominantly the causal factor then we lose sight of the role that policy makers play; there may be a tendency to treat the system as a rule-bound structure that leaves minimal room for the role of agency’ (Cairney, 2012: 353, emphasis in original).

Disciplinary adaptation may also involve drawing on ‘old’ or established concepts in each field – providing some way to compare new insights with the knowledge, gathered in the past, that we may still find useful (Cairney, 2012; 2013a).

NEW THEORY OR OLD WINE IN NEW BOTTLES?

Although complexity theory is often described as radical and new, many of its insights can already be found in policy studies. For example, focusing on theoretical and empirical studies of complexity, Klijn (2008: 302) describes complex systems as a series of policy ‘subsystems’, all of which have their own rules of behaviour and external forces to deal with (see also Bovaird, 2008: 321). This has been the general approach to policy studies for decades, at least since Hecló (1978: 94–7) highlighted a shift from the simple ‘clubby days’ of early post-war politics to ‘complex relationships’ at multiple levels of

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government and among a huge, politically active population (compare with Sabatier, 2007: 3–4; Jordan, 1981: 98; Richardson, 2000: 1008; McCool, 1998: 554–5).

Consequently, our task may be less about declaring theoretical or empirical novelty, and more about detailed comparisons between old and new concepts and forms of explanation. Relevant texts in the empirically-orientated policymaking literature include the following.

Path dependence and historical institutionalism. Path dependence suggests that when a commitment to a policy has been established and resources devoted to it, over time it produces ‘increasing returns’ (when people adapt to, and build on, the initial decision) and it effectively becomes increasingly costly to choose a different path (Pierson, 2000; compare with Room, 2011, 7–18). Pierson (2000: 253) and Room (2011: 16) adopt the same language (the ‘Polya urn’) and examples (such as the QWERTY keyboard) to describe the unpredictability of events and initial choices followed by subsequent inflexibility when the rules governing systemic behaviour become established and difficult (but not impossible) to change.

Punctuated equilibrium theory. Jones and Baumgartner (2005: 7; see also Baumgartner and Jones, 1993[2009]) argue that policymakers are surrounded by an infinite number of ‘signals’; they must simplify their decision-making environment by ignoring most (negative feedback) and promoting few to the top of their agenda (positive feedback). Negative feedback may produce long periods of equilibrium since existing policy relationships, rules and responsibilities are more likely to remain stable, and policy is less likely to change, when the issue receives minimal attention from policymakers. Positive feedback may produce policy ‘punctuations’ because, when policymakers pay a disproportionate amount of attention to an issue, it is more likely that policy will change dramatically. The ‘selective attention’ of decision makers or institutions explains why issues can be relatively high on certain agendas, but not acted upon; why these powerful signals are often ignored and policies remain stable for long periods. Change often requires a critical mass of attention to overcome the conservatism of decision makers and shift their attention from competing problems (Jones and Baumgartner, 2005: 19–20; 48–51). Information processing is characterized by ‘stasis interrupted by bursts of innovation’ and policy responses are unpredictable and episodic rather than continuous (Jones and Baumgartner, 2005: 20).

Lipsky’s idea of ‘street-level bureaucracy’. Lipsky (1980) suggests that there are so many targets, rules and laws that no public agency or official can be reasonably expected to fulfil them all. In fact, many may be too vague or even contradictory, requiring ‘street-level bureaucrats’ to choose some over others. The potential irony is that the cumulative pressure from more central government rules and targets effectively provides implementers with a greater degree of freedom to manage their budgets and day-to-day activities. Or, central governments must effectively reduce their expectations by introducing performance measures which relate to a small part of government business. Consequently, we can explain much ‘street-level’ behaviour with reference to how local actors interact with each other and their environment.

Hjern and Porte’s (1981) focus on intra-departmental conflict, when central government departments pursue programmes with competing aims, and *interdependence,* when policies are implemented by multiple organizations. Programmes are implemented through ‘implementation structures’ where ‘parts of many public and private

organizations cooperate in the implementation of a programme'. Although national governments create the overall framework of regulations and resources, and there are 'administrative imperatives' behind the legislation authorizing a programme, the main shaping of policy takes place at local levels.

Governance. A lack of central control has prompted governments in the past to embrace New Public Management (NPM) and seek to impose order through hierarchy and targeting. However, local implementation networks (with members from the public, third and private sectors) have often proved not be amenable to such direct control (see for example, Rhodes, 1997; Bevir and Rhodes, 2003; Kooiman, 1993).

Many of these texts also have an implicit or explicit argument about the limits to central control and the potential advantage to more local or less radical forms of policy-making. This compares to older work, with a relatively explicit message for policymakers, which seems to anticipate complexity themes:

Making policy is at best a very rough process. Neither social scientists, nor politicians, nor public administrators yet know enough about the social world to avoid repeated error in predicting the consequences of policy moves. A wise policy-maker consequently expects that his [sic] policies will achieve only part of what he hopes and at the same time will produce unanticipated consequences he would have preferred to avoid. If he proceeds through a succession of incremental changes, he avoids serious lasting mistakes (Lindblom, 1959: 86).

Consequently, we should reject the idea of novelty for novelty's sake. The value of complexity theory is not that it is new – it is that it allows us to use our knowledge of the natural and social world to understand and influence real world problems in a particular way. This may involve building on, rather than rejecting, the existing literature – or at least demonstrating (rather than merely asserting) why it should replace previous insights.

The former requires careful thought, to deal with concepts that may mean different things in studies of the natural and social world, and in studies of complexity which may or may not describe the same processes as established concepts (Cairney, 2013b). For example, part of the explanation for terminological similarities may be the tendency for intuitive terms to cross disciplines. It is possible that some terms – such as path dependence and sensitivity to initial conditions – may be used in areas such as computing science or systems biology to explore unpredictability, but in political science to explain long-term inertia and stability. Positive and negative feedback may be used differently in computing and political science, particularly when policymaking studies discuss the intentional, psychological process behind paying no/ high attention to issues. Some terms, such as 'first order', refer to major change in the physical world but minor change in policymaking (Hall, 1993). 'Chaos' may relate to a deterministic process in physics but be used, in common parlance and social science, to describe unpredictability. 'Local' outcomes may emerge in the absence of a centre in the physical world but despite the actions of the centre in the policymaking world.

Ultimately, complexity theory will only be valuable if we can produce some results. To a large extent, this involves the meaningful application of 'complexity thinking' to the study of real world problems by using case studies or other approaches. By 'meaningful', we mean that those studies do more than add a complexity gloss to the analysis. They use complexity theory to produce a broad understanding of the world, to guide the way in

which we seek to generate knowledge of it, and to guide their choice and use of methods. If the complex system underpins explanation, we would expect studies to identify the complex system, how it operates (which might include a discussion of the rules used by agents within it) and what outcomes emerge from the interaction between agents, the rules they follow, and their environment. Or, studies might identify particular aspects of a complex system and examine, for example, how agents adapt to their environments or how we can identify and explain the generation of rules within systems. In other words, they do more than just state that the world is complicated.

The case has to be made for the value of complexity theory as a way to organize the study of policy and policymaking. Ideally, we should be able to adopt the same language in a wide range of different case studies, to allow us to compare the results and consider the extent to which the same concepts explain behaviour in many cases. This is a high bar that is not always met, even in well-established policy-relevant theories such as punctuated equilibrium, the advocacy coalition framework and the institutional analysis and development framework (Cairney, 2013a; Cairney and Heikkila, 2014; Cairney and Halpin, 2015). However, in each of those cases there has been a marked attempt to set a common theoretical and methodological agenda, to allow the comparison of results and the accumulation of knowledge. This Handbook is an attempt to add to this process and eventually meet that 'high bar'.

PART I: THEORY AND TOOLS

These themes, and many others, are taken up in a variety of ways by the authors in Part I, 'Theory and tools'. For example, Graham Room argues that a major weakness in complexity is its limited discussion of power. This is partly because complexity theory and approaches developed in the natural sciences and other fields where this would not be a key issue. However, for the social, political and policy fields, it is essential. To respond to this, Room explores classic discussions of power in the social sciences, the insights that we can generate when we consider power and complexity, and the extent to which we can hold actors such as (but not exclusively) policymakers to account for policy outcomes when they depend on the interactions among many people in a complex system.

Adrian Little draws on complexity themes to engage with a fundamental question to philosophy and social science: how can we understand and conceptualize the real world? He challenges the way in which reality is conceptualized in international relations scholarship, and encourages political theorists to engage in a more meaningful way with politics by removing artificial barriers between their analysis of the real world and what political reality should be. Complexity theory suggests that what we call 'real' is a brief snapshot of a world that is always in flux. Consequently, to advance our study of policymaking in a complex world, we need to understand the problematic ways in which policymakers see and respond to it. This is an actor-centred account which suggests that what is 'real' to people is in fact what they need to see as reality in order to allow them to operate effectively within it.

Shifting into the field of law, Thomas Webb highlights the potential for complexity theory to prompt new thinking in legal studies. He draws on complexity terms, such as emergence and contingency, to argue that the legal process cannot be boiled down to a

set of simple laws and rules to be implemented by government bodies such as the courts. Rather, people interpret rules and interact with each other to produce outcomes that are difficult to predict with reference to the statute book. Webb identifies this broad argument in historical debates initiated by the Critical Legal Studies Movement in the US, but finds that they often became stalled when debates focused on the ideological biases of each position. He explores the ability of complexity thinking to take us beyond the politics of particular countries and produce a set of ideas to guide legal thinking.

Michael Givel explores the ability of complexity theory to advance, or provide an alternative to, US-dominated theories of policy process development. He identifies three main methodological positions relevant to political science – positivism, post-positivism and critical realism – to argue that complexity theory represents a major problem for positivist studies driven by a belief in objectivity and linear cause and effect. His critique is that, while many policy theories identify several aspects of complex policymaking systems, they still rely largely on positivist methods. His proposed solution is that policy scholars not only recognize, fully, the nature of complex systems, but also that they change their research assumptions and methods to allow them to understand such systems (compare with the chapter by Wellstead et al., which is more critical of complexity research and more hopeful about the contribution of established policy theory).

Following on this policy-oriented theme Göktuğ Morçöl examines the extent to which we can produce a general, unifying theory of public administration. He uses an analogy with the physical sciences – CERN and the Higgs boson particle – to make three key points. First, even in the physical sciences, with general laws regarding the make-up of the physical world and billions of dollars of research, scientists are still uncertain about their results. Second, although the natural and social sciences share a common focus of study, their *object* of study is different. Third, the social sciences involve a much higher degree of uncertainty because each individual is a complex system, not a constant. Consequently, it is less appropriate to think in terms of general theory and traditional methods. In that context, Morçöl examines the value of methods such as agent-based modelling and case study research.

Jim Price and Philip Haynes, with Mary Darking, Julia Stroud, Chris Warren-Adamson and Carla Ricaurte, shift the discussion from theory to tools by providing a ‘toolkit’ for policymakers and practitioners when dealing with complex policymaking and social systems. The seven key tools in their ‘Brighton Complex Systems Toolkit’ are: identify the properties and members of the system; think of leadership as the actions of many people, not just a CEO; encourage a sense of ‘self-organization’ in systems rather than seeking top-down control; accept that people must use short cuts to gather information and make decisions; develop appropriate ways to scan for information; experiment with policy interventions rather than seeing policy as key events; and evaluate policies regularly to pursue the pragmatic mantra, ‘do more of what works and less of what doesn’t’. Overall, these tools add up to a common theme in complexity theory: that we should identify a coherent alternative to the ideal-type of hierarchical corporate management headed by a single executive.

In the concluding chapter in this part, Eve Mitleton-Kelly presents the ‘EMK methodology’, a toolkit for policymakers and practitioners to use when trying to solve problems within complex systems. Building on 20 years of experience and 30 different projects, she has developed ten complexity principles, including the identification of interconnectivity

and interdependence between actors, and the properties of systems (feedback, emergence, self-organization, far from equilibrium) that can be applied to various policy situations. In her chapter she applies these to the case study of an Indonesian government agency, showing that they can be used to facilitate extensive conversations within an organization to identify problems in performance. For example, the process unearthed important concerns about staff attitudes to strong leadership, nepotism and individual behaviour.

PART II: METHODS AND MODELLING FOR POLICY RESEARCH AND ACTION

One consequence of the broad nature of complexity theory, the tension regarding its meaning, and the potential for many approaches in many disciplines, is that there is no inevitability about which method or modelling approach to use. As Stuart Astill and Paul Cairney discuss, we may decide that complexity requires new methods derived from other disciplines, or simply incorporate an understanding of complexity in well-established social science methods (perhaps including a mixed-methods approach). The same issue can be seen in relation to the level of simplicity we seek. For example, any method is a ‘model’ to a greater or lesser degree. To ‘model’ is to turn a system, whose complexity we cannot fully understand in its entirety, into a smaller number of key elements which interact to produce a complex system’s outcomes. As they demonstrate, the key is to examine the assumptions we make when we select and use any method – a task that may be particularly useful in fields which focus more on the sophistication of modelling methods at the expense of a ‘first principles’ discussion of why they use those methods in the first place.

Given Astill and Cairney’s argument that the methodological field for complexity is wide open, the following chapter by Liz Johnson takes this forward and provides an excellent introduction and overview of some of the core research and methodological tools of complexity and a robust justification for their importance to policymaking and policy actors. Stressing a goal of trying to ‘keep complexity simple’, she begins with a thorough review of some of the core vocabulary of complexity before walking the reader through introductions to network and agent-based modelling. Throughout, she argues that general policy theory does not adequately take into account how policymaking interrelates and intersects with complexity in the real world. Complexity theory and methods provide the means to move from research that describes *what is* to further inquiry into *what could be*. For Johnson, complexity methodologies can be tools for improving perspective and the practice of policymaking and policy research.

Kasey Treadwell Shine’s chapter tries to create a complex cartography of the policy-making process. The chapter does this through identifying key ‘first principles’ (such as emergent behaviour and complicity) and exploring the implications of social complexity and its ethical consequences, where policymakers act as ‘compass bearers’, correcting and re-orienting emergent ordering and pathways. It then goes on to explore these principles and concepts through two case studies, child poverty and social inclusion/exclusion policy, arguing that complex policymaking helps policymakers and others to decide when to ‘let go’ and let many hands make light work; when to be vigilant (for example at transition points); and when to ‘intentionally disrupt’ atypical pathways, to reconnect to pathways of educational advantage. Complex policymaking demands a new direction away from

evidence-based policymaking and towards evidence-informed policymaking (EIPM). EIPM asks, not ‘what works’, but ‘what are the best possible solutions for all’: recognizing and embracing change, over time and space, as the potential to achieve desired future(s).

Mirroring the earlier discussion in Astill and Cairney, Sylvie Occelli and Ferdinando Semboloni argue that in increasingly ICT-mediated human organizations, models can be effective vehicles for promoting dialogue between scientific experts and stakeholders and facilitating participative policymaking. Building on research carried out in Italy over the last decade, they examine how the functional and cognitive mediator roles of models in policymaking are addressed. They suggest that both design of models and the implications for the community using them should be given foremost attention and argue that by providing an epistemology for understanding social processes, models can help leverage the organizational capability of communities. To take advantage of models, however, co-evolutionary changes should take place: (a) in the encoding–decoding processes underlying model activities; and (b) in the ways in which policymaking activities are implemented in real governmental systems.

Bruce Edmonds and Carlos Gershenson review the purpose and use of models from the field of complex systems and, in particular, the implications of trying to use models to understand or make decisions within complex situations, such as those that policymakers usually face. This includes a discussion of the different dimensions of formalized situations, the different purposes for models and the different kinds of relationships they can have with the policymaking process. This is followed by an examination of the compromises forced by the complexity of the target issues. Several modelling approaches from complexity science are described (system dynamics, network theory, information theory, cellular automata, and agent-based modelling) with brief discussions of their abilities and limitations. Following some examples of policy case studies, they conclude by outlining some of the major pitfalls facing those wishing to use such models for policy evaluation.

To bring this part to a close, Mirsad Hadzikadic, Joseph Whitmeyer and Ted Carmichael discuss the strengths and weaknesses of applying agent-based modelling (ABM) to the domain of emergent social behaviour. They do this through a review of complex adaptive systems and ABM, looking in particular at some of the main aspects of ABM (agents, attributes, rules, adaption, fitness function and so on). In their case study of citizen allegiance during the Taliban insurgency in Afghanistan, funded by the Defence Advanced Research Project Agency, one of the most interesting aspects they found was of the geographic ‘clustering tendency’ of agents (both Taliban and pro-government forces) when the model was initiated. Despite this finding, and others, they stress that in many ways, designing agent-based models is ‘more art than science’ and at best they are aids to decision-making and not answers in themselves.

PART III: APPLYING COMPLEXITY TO LOCAL, NATIONAL AND INTERNATIONAL POLICY

In the policymaking field, the identification of a complex system is used to make suggestions which often represent a mix of descriptive and prescriptive elements, telling us how the world works and how we should respond. For example, a common argument is that law-like behaviour is difficult to identify because elements of the system interact

in different ways. Sometimes they reinforce each other, but sometimes they cancel each other out. The methodological conclusion is that we need to find ways to identify and measure this behaviour, which may defy traditional quantitative methods (or at least those which seek to produce ‘linear’ results). The broader philosophical conclusion is that any method produces evidence of snapshots in time – prompting us to consider how much we can generalize and how many claims we can reasonably make from limited data.

The practical conclusion is that a policy that was successful in one context (one place, one time) may not have the same effect in another. In some cases, we may be able to identify the elements which interacted to contribute most to policy success, but not that those elements will interact in the same way in a different time or space. Since policymaking systems change so quickly, and are so difficult to predict and control, policymakers should not be surprised when their policy interventions do not have the desired effect. Instead, they should adapt quickly and not rely on a single policy strategy.

This major limit to our knowledge of, and ability to control, policymaking systems often produces a ‘bottom up’ or local approach to practitioner advice, with arguments including:

1. Rely less on central government driven targets, in favour of giving local organizations more freedom to learn from their experience and adapt to their rapidly-changing environment.
2. To deal with uncertainty and change, encourage trial-and-error projects, or pilots, that can provide lessons, or be adopted or rejected, relatively quickly.
3. Encourage better ways to deal with alleged failure by treating ‘errors’ as sources of learning (rather than a means to punish organizations) or setting more realistic parameters for success/ failure.
4. Encourage a greater understanding, within the public sector, of the implications of complex systems and terms such as ‘emergence’ or ‘feedback loops’.

In other words, this literature tends to encourage a movement away from rigid governmental hierarchies, top-down policymaking, centrally driven targets and performance indicators – all based on the idea that a policymaking system can be controlled, that policymakers can impose order (Geyer and Rihani, 2010). A policy approach based on this belief in order, determined by the centre, may simply result in policy failure and demoralized policymakers. In that context, complexity theory often represents a counter-narrative set up to challenge the mechanical, ‘state in control’, approach in which governments go through a periodic process of failure, ‘learning lessons’, reform and failure because they support a governing system doomed to fail and produce blame (Geyer, 2012). This is not a straightforward task, particularly in countries with a ‘Westminster model’ understanding of accountability and responsibility, based on the centralization of power in government to ensure accountability to the public through Parliament. In that context, a counter-narrative based on our analysis of the real world may have to be accompanied by a narrative of democracy and accountability.

We have set out this advice in relatively straightforward terms, but this is not always a feature of complexity theory-derived practitioner advice. There is great potential for the advice to be too jargon-filled and unattractive to busy practitioners with their own

language (unless practitioners are trained in relevant policy skills – see Hallsworth and Rutter, 2011: 30). Or, the translation may produce rather banal advice. The onus is on complexity theorists to provide understandable, meaningful and valuable advice that practitioners cannot get elsewhere. For example, it has proved possible to make these arguments against centralization without reference to complex systems, and some advice (such as ‘use trial-and-error as a strategy’) could be described as little more than common sense (Geyer and Rihani, 2010: 186). There is an onus on complexity theorists to demonstrate that their advice is more than a fashionable way to repackage old advice.

These themes are taken up in Part III, ‘Applying complexity to local, national and international policy’ where we have asked a mixture of practitioners and academics to explore the implications of complexity for distinct policy areas. Catherine Hobbs embodies this combination of ‘pracademic’, with over 20 years in UK local government and seven years of research activity. In her chapter, she argues for a radically ‘complex’ approach to local government in the UK. At present, pressures for budget cuts, increasing public demands and ‘getting more for less’ put intolerable strains on local government where retrenchment seems to be the only answer. She contends, following an excellent review of the complexity and local policy literature, that the current juncture can also be an opportunity to apply the broad and growing body of literature on complexity and policy to open up new policy debates, structures and actions. This should help local policy actors to accept the reality of complexity and learn how to make it work for, rather than against, them. She concludes that only if researchers and policy actors continue to ‘polish the gem of complexity’ will they be able to open up a new, positive and more flexible approach to local government.

Also in the UK, Tony Bovaird and Richard Kenny examine how a recent project exploring the cause-and-effect chains connecting government agency initiatives in Birmingham with their public outcomes has revealed a number of service areas and interventions which were not susceptible to conventional cause-and-effect analysis, despite cost-effectiveness claims by the stakeholders involved. Bovaird and Kenny then go on to explore these areas, first by seeking to classify them within the CYNEFIN framework (Snowden and Boone, 2007) to establish the knowledge domain in which the various stakeholders believe they are working and then by identifying and studying some of these service areas and interventions as potential complex adaptive systems. They demonstrate that there are areas of public sector intervention where the complexity lens is appropriate, that some of the current claims to cost-effectiveness of these interventions cannot be justified and that these interventions would be more appropriately managed if a complexity perspective were applied.

Exploring local policy changes in a very different part of the world, Kai Lehmann brings together an international and local dimension to his chapter by examining the implications for complexity thinking on the ‘intractable’ problems of violent crime in São Paulo and Rio de Janeiro. Both cities had extremely high homicide rates in the 1990s – responding with traditional strategies of ‘containment’ and ‘confrontation’. However, in the 2000s both cities began to look at the problem of violent crime in new, more flexible and adaptive ways. Without being aware of the work on complexity, they began to adapt strategies that mirrored much of what complexity thinkers would suggest: recognize that the violence is part of an evolving complex process and that the police and local governments are ‘interacting’ with that process and not something external to it. As he

points out, in many ways changing the perception of the police (from ‘killing bad guys’ to ‘calming the violence’) had a fundamental impact on the actions of the communities and the perpetrators. For Lehmann, recognizing the underlying complexity of the problem is the key to maintaining the successful strategies of these two cities.

Continuing the international-local theme, Qian Liu explores the complex interaction of migration and education policy in China by examining the policy changes and pressures on local authorities and policy actors in Beijing to respond to the changing educational needs of internal migrant children. With the massive growth in urbanization in China during the past 20+ years, large numbers of migrants have moved into the cities. Previously, the children of these migrants had very limited rights to education in these urban areas, leading to the rise of various types of self-organized schools and educational institutions in response to local education needs. Recent central government policy changes have begun to improve the education rights of these children, but this has put huge pressures on local schools and existing semi-legal migrant schools. From a study of one particular area in Beijing, Qian Liu argues that implementing these changes will continue to be a complex adaptive process where the various stakeholders will play a key role.

Using a more quantitative approach, Annalisa Caloffi, Federica Rossi and Margherita Russo explore an area with strong linkages to complexity: social network analysis (SNA). Using SNA, they argue that our understanding of what network configurations contribute to innovation and how they do so is still very limited. In order to stretch these limits they focus on the role of ‘intermediaries’ in innovation networks and argue that their role is much more important than just being an organizational ‘matchmaker’. Using a quantitative study of innovation networks created by EU regional funding in the Tuscany region in Italy in the 2000s, they analysed the networking roles of 1366 different organizations. Their general conclusions were that intermediaries were primarily local governments, though intermediary roles were played by a wide variety of institutions and varied from project to project. Moreover, while ‘brokers’ (linking unconnected agents) tended to form in turbulent environments, ‘intercohesive agents’ (bridging cohesive communities of network agents) primarily operated in more stable environments.

Continuing the theme of the importance of local networks, Daniel Nohrstedt conducts an empirical study of adaptive capacity in local-level emergency preparedness collaborations in Sweden. Given the uncertainty of risks and threats, local managers in emergency preparedness generally engage in networking to mobilize knowledge and other resources from multiple stakeholders. But even if collaborative management is elevated as a precursor to effective crisis management, the effects of networking in this area are still poorly understood. The chapter illustrates how complexity theory and concepts can be applied to structure empirical analysis of collaborative performance in crisis governance. Using survey data on emergency preparedness in Swedish municipalities ($n = 290$) over a period of four years (2009–12), the chapter investigates the relationship between adaptive capacity and outcomes (capacity to respond to crisis) in Sweden and draws some implications for complexity theory more generally.

Shifting to a broad-ranging discussion of planning, Gert de Roo begins his chapter with a detailed history of the main approaches to urban and spatial planning since WWII. He charts the rise and fall of centralized planning based on the ideas of certainty, linear science and ‘planning for control’. This was followed by the rise of the

‘communicative turn’ in planning that recognized the uncertainty and contingent nature of the planning process and strived to create an ‘agreed reality’ between planning actors and society. However, for de Roo the communicative turn is not enough to embrace the increasingly non-linear complex reality. For a non-linear world, planning must embrace ‘adaptive planning’ where the planner must act as a manager of change trying to enhance the positive effects of change for communities and societies as a whole and minimize its possible negative effects. This ‘post-normal’ scientific perspective radically challenges traditional interpretations of and policy strategies for all forms of planning.

Focusing on health policy in general, Tim Tenbenschel examines the use of complexity theory in the literature on healthcare policy. This has two main elements: the idea of ‘upstream’ health policy, which focuses on the complex causes of health outcomes; and ‘downstream’, which examines the complex interplay among actors in health services. Focusing primarily on the latter, he identifies a general use of complexity as a metaphor for healthcare systems. Most intriguingly, Tenbenschel makes a distinctive argument about the normative implications of complexity theory for healthcare management. A general argument in this literature is that we should encourage the kinds of ‘bottom up’ interaction and outcomes that emerge in the absence of central coordination. However, he challenges this account, arguing that it relied on a caricature of ‘top down’ and hierarchical, command and control policymaking that no longer exists in modern governments. Instead, he stresses the importance of new forms of organization which combine government, market and network solutions.

Ben Gray carries on the focus on healthcare by providing an in-depth perspective of a busy practitioner trying to make sense of his work within a complex healthcare system. He argues that doctors are commonly confronted by organizations (such as pharmaceutical companies and some governments) promoting simple interventions and ethics scholars advocating simple principles for all doctors to follow. However, neither is adequate in real world situations. Building on the difference between simple, complicated and complex problems in healthcare, Gray explores how to seek pragmatic solutions when faced with limited information, complexity, and the need to negotiate medical decisions with a wide range of colleagues and patients.

Moving from health to climate policy, Adam Wellstead, Michael Howlett and Jeremy Rayner identify an important irony in the complexity literature: complexity thinking is used increasingly to identify problems with climate change, and our need to adapt to climactic complex systems, but it is not used to understand the complex policymaking system itself. Instead, there is too much reliance on a ‘black box’ or functional understanding of policymaking in which policy simply reflects what is required of it. In this context, the ability of climate scientists to influence the policy process is limited, because they present vague or unrealistic recommendations to policymakers and do not know enough about the policy process to engage with its key actors. Wellstead et al. argue that, for complexity theory to become a useful bridge between natural and political science, its advocates need a greater understanding of ‘meso level’ political processes such as governing institutions and the networks between government and non-government actors.

Keeping the focus at the global level, Ugur Bilge provides an in-depth case study to demonstrate the value of agent-based modelling to examine scenarios in complex systems. Drawing on work commissioned by bodies such as the Finland government,

he produces a model of global trade to simulate a range of scenarios over the next three decades. The main focus of this ABM simulation is on the role of the US and China, simulating what would happen if their relationships changed markedly in favour of one country or the other. The added-value to this discussion is the ability of an ABM to examine the role of major shocks to systems and even to explore potential ‘butterfly effects’ (how a small country could cause a major global economic crisis) on these shocks and responses.

Concluding the global policy theme, Philip Haynes draws on complexity themes and concepts to explore the international financial crisis in the middle to late 2000s. He argues that the global financial system has the attributes of a complex social system. Consequently, it cannot be controlled easily using traditional economic levers by individual countries, particularly since major companies are mobile and able to move money across the world. Haynes identifies sources of attractors and instability in this system and explores the ability of governments to influence its outcomes, comparing the limited influence of domestic measures with the potential for more effective measures based on international collaboration.

Finally, to end the Handbook, Cairney and Geyer will assess what this volume says about the current state of complexity, where complexity may be going from here and if a complexity informed policy process is really something new and possible.

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