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The uncertainties of complexity in policy studies

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Abstract

The exploration of complexity is an intriguing contemporary development in the field of public policy. While undoubtedly still a specialist interest, there have been several notable recent contributions to the literature, including the publication of a handbook devoted to the topic of complexity and public policy. Yet, the concept of "complexity" enters the literature in different ways in rather different guises. Some take their cue directly from complexity science and the modelling of complex adaptive systems. This carries with it significant ontological commitments. Indeed it poses some challenging questions regarding the aspirations for the control and direction of social systems that are typically seen as underpinning public policy. Others invoke the idea of complexity either metaphorically or in loose analogy to thinking about complexity in natural systems, without seeking to make the claim that comparable causal mechanisms are in operation in social systems. Still others self-consciously seek to synthesize concepts drawn from the complexity literature with other strands of thinking in social science, focused on the way in which social institutions shape social interaction or the operation of power in shaping both policy and its contexts. Here the challenge of the reflexive agent needs to be addressed directly.

The aim of this paper is, first, to approach these debates from the perspective of ontology and epistemology in a bid to map out more explicitly the positions being adopted in the literature. Second, it seeks to reflect upon the roles for, and potential of, public policy that are implied by the different positions taken in this debate. Finally it returns to a question explored by Paul Cairney (2012) and considers whether drawing on complexity concepts does – or, in principle, could – substantially advance our understanding of public policy, or does little more than represent some well-established ideas in a new framing.

1. Introduction

The exploration of the concept of complexity is one of the most intriguing contemporary developments in the field of public policy. It reflects a growth in interest in complexity in the social sciences more broadly (Byrne and Callaghan, 2014; Boulton et al, 2015). While undoubtedly at present still a specialist interest, there have been several notable recent contributions to the literature (eg. Geyer and Rihani, 2010; Room, 2011, Morcöl, 2012; Room, 2016), including the publication of a handbook devoted to the topic of complexity and public policy (Geyer and Cairney, 2015). Yet, right from the outset, the policy literature has recognised that engagement with complexity is by no means straightforward: the concept of "complexity" enters the literature in different ways in rather different guises. Some take their cue directly from complexity science and the modelling of complex adaptive systems. This carries with it significant ontological commitments. Indeed, it poses some challenging questions regarding the aspirations for the control and direction of social systems that are typically seen as underpinning public policy. Others invoke the idea of complexity either metaphorically or in loose analogy to thinking about complexity in natural systems, without seeking to make the claim that comparable causal mechanisms are in operation in social systems. Still others self-consciously seek to synthesize concepts drawn from the complexity literature with other strands of thinking in social science, focused on the way in which social institutions shape social interaction or the operation of power in shaping both policy and its contexts. Here the challenge of the reflexive agent needs to be addressed directly.

Given the diversity of approaches to complexity and public policy that have been proposed and pursued, and the failure, at least thus far, to converge on an agreed understanding of what complexity offers public policy, it is possible that after nearly a decade of active debate the agenda is losing momentum. Will the turn to complexity turn out to be little more than a

passing fad? Certainly, more recent assessments of the potential offered by complexity are considerably more circumspect than some of the earlier more enthusiastic contributions.

This paper has three main aims. First, it approaches these debates from the perspective of ontology and epistemology in a bid to map out more explicitly the positions being adopted in the literature. Second, it seeks to reflect upon the roles for, and potential of, public policy that are implied by the different positions taken in this debate. Finally, it returns to a question explored by Paul Cairney (2012) and considers whether drawing on complexity concepts does – or, in principle, could – substantially advance our understanding of public policy, or does little more than represent some well-established ideas in a new framing.

2. Ontological and epistemological questions

One of the virtues of the debate over complexity and public policy is that it invites, indeed demands, attention to foundational questions. Engagement with ontology and epistemology is perhaps more prevalent – and more wide-ranging - in this corner of the policy literature than elsewhere (most extensively, Morcöl, 2012). Given the embrace of complexity is styled a paradigm shift this is understandable.

The challenges in incorporating complexity thinking into the analysis of public policy are several. The first is simply getting past the common-sense use of the term as a synonym for complicated, interconnected or difficult and confer upon it a more specific, technical meaning. The second is the recognition that complexity thinking as it originated in the natural, biological and information sciences has yet to deliver a unified body of theory. The differentiation between complexity science, on the one hand, and complexity theory or

complexity thinking, on the other, is significant. Some, such as Phelan (2000), argue for the boundary between the two to be policed rigorously because only the former deserves the honorific of being considered a science. Diversity in the origin disciplines opens up the scope for diverse applications in the policy sphere. A core set of concepts recur – eg. self-organisation, emergence, non-linearity, path dependence, coevolution, complex causation – but their interpretation may differ significantly.

Approaches to complexity and public policy differ most profoundly in the degree to which they seek to transpose approaches from complexity sciences directly into the analysis of policy, thereby subscribing to the belief that the social world will yield to the application of similar analytical tools. Complexity science arguments are deterministic: it is possible to explain apparently complex aggregate system behaviour on the basis of clearly specified and relatively simple microbehaviour. Agent-based modelling is the clearest example of students of policy adopting analytical approaches familiar to complexity scientists working on natural or biological research (eg Bilge, 2015). Broadly speaking, agent-based modelling relies on decentralised decision-making by independent rule-bound agents to generate self-organisation and emergent aggregate social phenomenon. If the models code into the agents the ability for rule-based learning then the models can display coevolutionary behaviour to produce a complex adaptive system.

Researchers may, however, differ on the extent to which they are making realist claims about such models. That is, when such models generate system behaviours that map plausibly on to those of analogous real-world systems, to what extent it is claimed that observed real-world social patterns are causally generated by individual decision makers following simple rules of the type specified in the model. The alternative is to take a more instrumentalist position. This is an important question if one sees scientific explanation as primarily concerned with

making claims about real causal mechanisms. The alternative of simply pointing out that models generate outcomes that look similar to those in the real world has been dismissed as pseudoscientific 'resemblance thinking' (Phelan, 2000) with no real analytical purchase.

The move through these different types of models carries with it significant implications for issues of great concern to policy studies. The move from the types of linear models much favoured by conventional policy science to recognise non-linearity makes the analysis more challenging but doesn't, in principle, significantly reduce the scope for systematic knowledge of the system. However, recognising a system is self-organising and can display emergent properties means that history matters to model outcomes and knowledge of systemic properties becomes at best probabilistic. The Schelling model of residential segregation is the classic example here. Given the model parameters, it is possible to make qualitative and probabilistic statements about the extent of residential segregation that will occur in a particular simulation, but not the location or scale of the clusters that will form. If a model takes a step further an allows for evolutionary behaviour then the prediction both of model outcomes and the implications of any simulated policy intervention becomes inherently uncertain (see Allen, 2000, for an extended discussion). Hence the more fully ideas from complexity science are embraced the more radical the implications for policy effectiveness.

An alternative to adopting the complexity science approach is to distinguish between the nature of complexity in the physical, biological and social world. The presence of knowing and reflexive subjects in the social world means that social complexity has different characteristics to complexity in other realms. Its origins lie in uncertainty and strategic behaviour. It is not possible to transpose arguments from the other realms either without significant modification or by treating the reference to complexity as more metaphorical than real. Here researchers are not necessarily claiming that comparable causal mechanisms are in

operation in social systems. Indeed, Geyer and Rihani (2010; see also Geyer, 2012), for example, advanced the argument that the analysis of social complexity requires a new suite of primarily qualitative analytical tools.

The interaction of natural, biological and social systems, where complexity may take different forms in each, brings a further layer of difficulty to the analysis. The interaction between policy and natural systems is an avenue explored by several of the contributions to Teisman et al (2009).

An alternative route to recognising the different approaches to complexity is Morin's distinction between with the restricted complexity of complexity science and general complexity:

> Restricted complexity made it possible important advances in formalization, in the possibilities of modeling, which themselves favor interdisciplinary potentialities. But one still remains within the epistemology of classical science. When one searches for the "laws of complexity", one still attaches complexity as a kind of wagon behind the truth locomotive, that which produces laws. A hybrid was formed between the principles of traditional science and the advances towards its hereafter. Actually, one avoids the fundamental problem of complexity which is epistemological, cognitive, paradigmatic. To some extent, one recognizes complexity, but by decomplexifying it. (Morin, 2006, 6)

While some researchers pursue methodological monism and others approach complexity qualitatively or metaphorically, still others self-consciously seek to synthesize concepts drawn from the complexity literature with existing strands of thinking in the policy literature. Room (2011), for example, focuses on the way in which social institutions shape complex social interaction. The argument here is that taking the complex systems perspective as the starting point, and accepting that the social and policy worlds display the characteristics of complex adaptive systems, is a way of orienting the analysis, but not of completing it. It is

necessary to recognise that it is the institutional context that shapes the terrain upon which the system adapts and it is through policymakers altering the institutional landscape (eg the rules of the game) that system evolution can to an extent be shaped. This is an approach which seriously engages with both complexity thinking in its origin disciplines and the need to take the distinctive characteristics of the social world seriously.

If we were to interpret this approach via the notion of knowledge paradigms then we might consider this type of analytical strategy to be analogous to bricolage in the sense used by Carstensen (2011) to discuss ideational change in policy. While policy change might withstand the risk of internal inconsistency such attempts at bricolage may produce, it would be an inappropriate stance to adopt in academic knowledge production (as discussed by Cairney, 2013). However, for reasons touched on below, it is possible to produce arguments in support of this approach to handling complexity.

The debate over complexity and policy has explicitly engaged with broader debate in the philosophy of social science. While most authors who take the complexity turn see this as a rejection of a simple positivist position, views differ on precisely which alternative position is implied by complexity. Those closest in orientation to complexity science would tend to adopt some form of critical realist position that implies complexity-inspired analysis is, even if the mode of analysis is primarily qualitative, seeking real structures and mechanisms underpinning social outcomes (eg Room, 2016; Gerrits and Verweij, 2013). An alternative position is to look to pragmatist philosophy to underpin analysis as the search for useful knowledge rather than fixate on the question of whether mechanisms identified are real (Ansell and Geyer, 2017; Sanderson, 2009). Finally, there are those who have taken the turn towards complexity but when applying it to policy see the approach as sympathetic to postpositivist positions (eg Morcöl, 2012). There are more radical approaches which frame

complexity in poststructuralist terms (Cilliers, 1998) but they are yet to find a great deal fo traction in the complexity and policy debate.

We might well consider it valuable that these diverse perspectives on complexity are being worked through in the literature as researchers attempt to fathom the potential implications for theorising policy of embracing complexity. But it means that, given the current state of the debate, to ask what the implications of 'complexity' are for public policy is too vague to be helpful. It may be that over time the literature will coalesce around one or other positions and as a consequence the message will clarify. But we are not there yet.

3. The aspirations and expectations for complexity and public policy

While complexity and public policy has been declared "a new approach to 21st century politics, policy and society" (Geyer and Rihani, 2010), others have been considerably more sceptical (eg. Pollitt, 2009). The criticisms of complexity and public policy are several. Perhaps the most prevalent are that it isn't obvious what value reframing the analysis in complexity terms adds that takes us beyond existing analytical frameworks and it isn't clear that complexity brings with it any testable hypotheses or useful propositions to assist policymakers. The first of these will be considered in the next section. I'll focus upon the second in this section.

There are several distinct lines of response to the criticism that complexity approaches don't offer any testable hypotheses or useful propositions to assist policymakers.

In some respects the complexity literature has suffered from the way in which it has made its own case. It is common to start discussion of complex systems by contrasting complexity approaches with Newtonian mechanics, linearity and covering law explanations. This is no doubt an essential contrast to draw. But it is not necessarily the most revealing contrast to draw when locating complexity approaches in the policy literature. And here again it is helpful to draw a distinction between the academic policy literature and real world policy approaches. Much real-world policy rhetoric is based upon simple notions of linear causation, but we need to recognise that there are imperatives facing governments not only to act but to claim to do so in ways that will be, and are, effective. That may say less about policymakers' understanding of their role and scope for action than their audience's expectations of government.

But it would be inappropriate to cast the academic policy literature as being stuck on this mode of thinking. For sure positivism is present in the field, but there is already plenty of work that is primarily interpretivist and which seeks a rich understanding of policy processes and effects, and which is sceptical of the pursuit of general laws. We may suffer here from the gap between the relatively few statements of 'official' methodology – for example, Sabatier's (2007) pronouncements about the nature of science and demarcation criteria – and the richer world of the actual practice of research in policy studies.

The criticism that complexity-inspired approaches do not deliver testable hypotheses or generalisations of broad applicability that allow us to make deductions or predictions rests on an understanding of the social scientific endeavour that belongs to a particular paradigm. It implies a specific understanding of the aspirations for social scientific knowledge. Yet this aspiration is one that is not necessarily shared by researchers in several branches of policy

studies. The criticism could equally be applied to work rooted in, for example, historical institutionalism. As such the validity of the criticism is not necessarily accepted.

Some have suggested the value of complexity-based approaches is likely to be greater in guiding policy than in core academic debates (Cairney, 2012). There is, however, scepticism on this point. The criticism that complexity-based approaches do not deliver useful guidance to policymakers needs to be kept separate. It is entirely possible that an analytical approach can be valuable without it generating concrete guidance for policy. That would particularly be the case where the analysis points to the limits of policy action or the unpredictability of policy effects in the face of complex causation and social systems that cannot be understood with certainty.

Authors writing on complexity and policy have proposed a number of tools for helping policymakers to think about policy prospectively (Room, 2011; Geyer and Rihani, 2010). These are frameworks for thinking about the issues pitched at a high level of generality. But they are almost invariably rooted in the argument that policy interventions in complex systems are highly uncertain and, as a consequence, overconfidence and over-specificity regarding policy effects is unwise. Empirical studies provide vivid illustrations of these uncertainties (eg. van der Steen et al, 2013). The emphasis is upon trial-and-error strategies rather than long-range planning because the unknowability of initial conditions coupled with complex causation means a system will soon diverge from its expected or planned trajectory (Sanderson, 2009). This points to a different mode of thinking about policy. Policymaking is viewed as more about steering and shaping the terrain upon which social action occurs – a terrain that is beyond government's control - than it is about top-down direction (Room, 2011; Colander and Kupers, 2014).

This mandate for modesty in policy aspirations is, in itself, valuable. It may not be a message that policymakers are keen to hear, but it may be the message that they need to here. It raises the challenge of how to reconcile the limits of policy effectiveness with public expectations of effective policy. It also raises relatively unexplored questions for other increasingly influential strands of government activity like horizon scanning. Those are important questions, but they are not in themselves a reason for concluding complexity-inspired approaches are inappropriate.

But there is an ongoing research agenda here. One of the key questions of current concern returns to the role of social agency and power. Complexity approaches which model complex systems on the basis of rule-following individuals generally assume a lack of social agency. Even if the theoretical framing is one of a complex adaptive system it is through local learning that the system in aggregate evolves: no one has the power to restructure the system itself. In contrast, approaches that take a more qualitative or metaphorical perspective on complexity ascribe greater scope for action to policy actors. But the explicit theorisation of power in a complexity context is relatively underdeveloped. The paper by Room (2015) raises the issue forcefully and attempts to theorise the nature of the power differential between actors. The task of integrating an explicit theory of power into complexity-based approaches is ongoing.

A further question which remains to be fully explored is the extent to which broader cultural variables need to be recognised in complexity-inspired approaches. The presumption is that social systems are complex systems. But the extent to which they deliver complex behaviour will be affected by the value of key system parameters (see Edelenbos and Eshuis, 2009, for a related discussion). These are likely to vary spatially. For example, the extent to which attempts at top-down implementation is a success depends in part on the broader culture in

which the policy system is embedded: the likelihood of ministerial orders being implemented is greater in some places rather than others depending on the costs of not implementing them, for example. To what extent do these cultural factors affect the way in which complex policy systems operate? That is, to what extent to broader social institutions stabilize the potential effects of non-linearity and keep systems operating in more predictable ways? In the implementation debate we might discuss these issues in terms of value convergence between the policymaker and implementing agency or the normative constraints upon implementers. But from a complexity perspective we can think about these as system parameters that determine the extent to which the system will exhibit complex behaviours.

4. The difference complexity makes

Paul Cairney (2012) considered whether drawing on complexity concepts does, or could, substantially advance our understanding of public policy. It is possible to argue that many of the key arguments advanced from a complexity perspective are not in fact new, rather they are already present in different branches of the literature. Cairney identifies path dependency via historical institutionalism; punctuated equilibrium; and emergent behaviour via implementation theory and governance as key ideas in the complexity literature that are already present in the policy literature.

While this is an important point upon which to reflect, the value of altering perspective, in itself, should not be understated. It is equally important to consider whether superficial similarities in terminology disguise substantial differences in the analysis.

The idea of path dependence in historical institutionalism, for example, was developed in part as a counter to the idea that social processes would reach an optimum based upon rational choice. That is, it sought to explain deviations from what was, at the time, presumed to be the norm. The claim is also not that all processes are path dependent but that some may be. The debate continues as to whether the conditions for, and causal processes driving, path dependency have been adequately identified. In contrast, from the complexity perspective the starting point is that complex systems by their very nature exhibit path dependency. It is a qualitatively different starting point.

Similarly, the argument that implementation theory encompasses emergent behaviour – even if it doesn't quite label it as such – is surely correct. The literature on the bottom-up approach and street level bureaucracy provides a range of reasons for expecting policy outcomes to diverge from the aspirations of top-down policymakers. But again this is a case of deviation from expectations. Some may see that as an inevitable feature of the policy process, others may think in terms of an 'implementation gap' to be eradicated. For some it opens up normative questions about the subversive actions of bottom-up policy makers. Complexity approaches would start from the premise that emergent behaviour is inherent to complex systems: it is not something that can be eradicated, even if that were considered normatively desirable. Again, it is a qualitatively different starting point.

Hence, while these different theoretical framings may be dealing with the same or similar concepts, the way in which they are understood and interpreted is different.

A second response to the question of whether reframing analysis in complexity terms adds substantially to our understanding would be to consider parsimony. The push to rational choice theory in political science was in part rooted in a claim that a single framework was

capable of accounting for a diverse range of behaviour, and therefore was to be preferred over alternatives. Hence, if it were possible to explain a range of relevant phenomena using complexity theory, that would otherwise require us to draw on several different branches of policy theory, then would an appeal to parsimony suggest that complexity-based approaches are to be preferred? An argument along these lines would be that complexity offers a coherent framework within which to a broad range of policy phenomena can be encapsulated with a relatively small range of concepts.

A third response to this question would be to argue that to think in terms of complexity-based approaches versus more conventional policy theory is not to frame the issue in quite the right way. We can think of complexity thinking as providing a metatheory through which to approach the analysis of policy, akin to a paradigm. That is, the starting point for the analysis is that policy systems, and the interaction between the policy system and other systems in a system of systems, will display the characteristics of complex systems ie. self-organisation, emergence, path dependency etc. But the analytical task remains to specify the causal processes that drive complex behaviour. In order to provide an adequate account it would be necessary to draw on a range of other theoretical resources. This is the position that Room (2011) takes when arguing that complexity thinking alone is not sufficient to deliver explanations of social and policy systems and that it needs to be supplemented with ideas from institutionalism.

Cairney (2012) raised important questions about whether complexity adds very significantly to our understanding of public policy. The evolution of the agenda since then has arguably led some to express greater caution, or increased scepticism, as to whether it does, or conceivably can. Yet, the argument here is that there may be grounds – not necessarily well

rehearsed in the debate – for taking a more positive view of the contribution that complexity thinking can make to advancing our understanding.

5. Conclusion

The literature on complexity and public policy is now reasonably well-established. But it has not necessarily coalesced. The diversity of understanding of complexity in the origin disciplines has been refracted in to the policy discussion. While that might speak to a potential richness of potential insight, it might equally speak of the relative immaturity of the research literature. It undoubtedly is a source of frustration for those wedded to positivistic models of scientific knowledge and to those who look to policy theory to provide actionable insights. Perhaps the most telling insight from the complexity and public policy debate so far is precisely the difficulties in delivering certainties to policymakers in the face of non-linearity, self-organisation, emergence and coevolution. This may be scant consolation to the practical policymaker who will be held to account by an electorate expecting effective government.

This paper has tried to argue that evaluating the contribution of complexity to public policy could be approached in a more nuanced way and that the benefits of a complexity approach may lie in directions other than those in which they have thus far been sought. Even if one considers that complexity-influenced approached do little more than represent some well-established ideas in a new framing, the power of such reframing to reoriented and integrate thinking should not be underestimated.

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